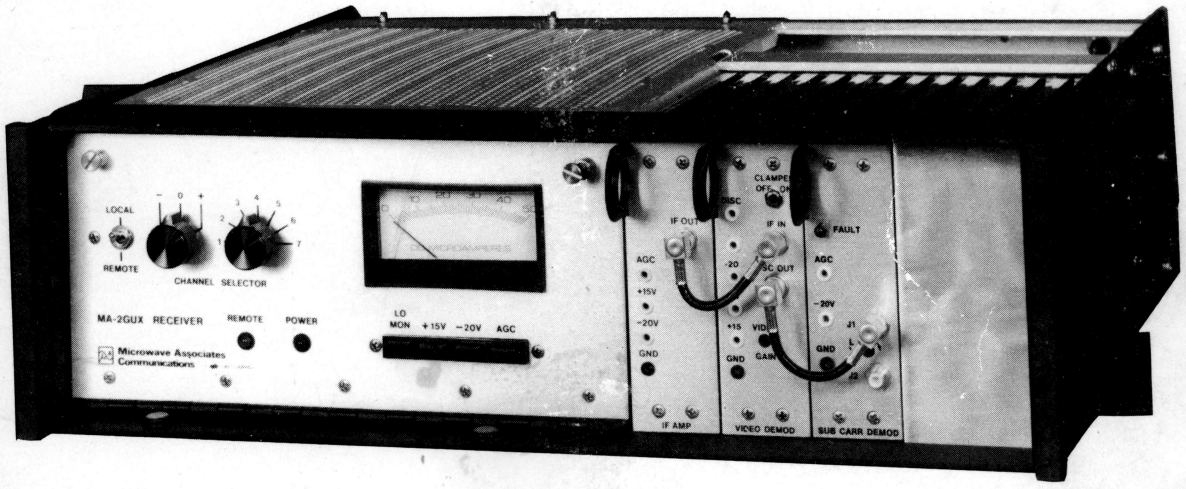
PN 808801

MA-2GUX RECEIVER



INSTRUCTION MANUAL

MACOM

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SECTION 1
EQUIPMENT DESCRIPTION

GENERAL

The MA-2GUX all channel Receiver (Figure 1-1) is a high performance 2 GHz Receiver designed for central receive site, electronic news gathering (ENG) applications. A frequency synthesizer provides full frequency agility over the 2 GHz band (1.990 to 2.110 GHz) including 7 primary and 14 offset channels for a total of 21 channels. Precise frequency selection is assured with no danger of locking on the wrong channel as with some AFC controlled receivers. Channel selection is achieved through either local or remote mode.

A low noise preamplifier is standard providing an overall receiver noise figure of 4.0 dB. Adjacent channel rejection is extremely high, and superior dynamic range permits high quality performance over a wide range of RF input levels.

POWER REQUIREMENTS

The MA-2GUX operates from a 115 Vac (50 to 60 Hz) power source. Power consumption is 100W maximum.

MECHANICAL FEATURES

The MA-2GUX is a rugged unit designed to be mounted in a standard EIA equipment rack. The chassis is 19 inches (48.3 cm) wide by 15 1/8 inches (36.8 cm) deep by 5 1/4 inches (13.3 cm) high (3 rack units).

The receiver has removable plug-in modules with front test points for maintenance purposes. In addition to the removable plug-in modules, the Receiver RF modules are located within the chassis behind the front meter panel. Access to these modules is through the removable top plate (Figure 1-2).

All input and output connections including a remote frequency control connector are located on the back plate (Figure 1-3). A terminal strip, also located on the back panel provides for audio output signals and alarm functions.

Four pushbutton switches are used in conjunction with the front panel meter for monitoring receiver operation. Front panel indicator lamps and test points are provided for rapid visual operational checks of vital functions and to facilitate equipment fault locations.

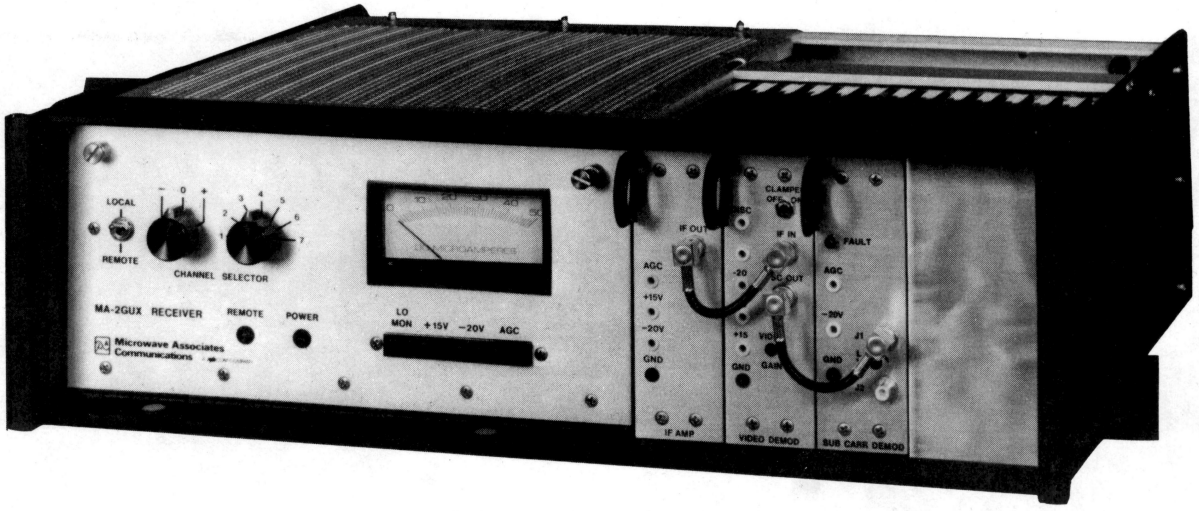


Figure 1-1. MA-2GUX Receiver

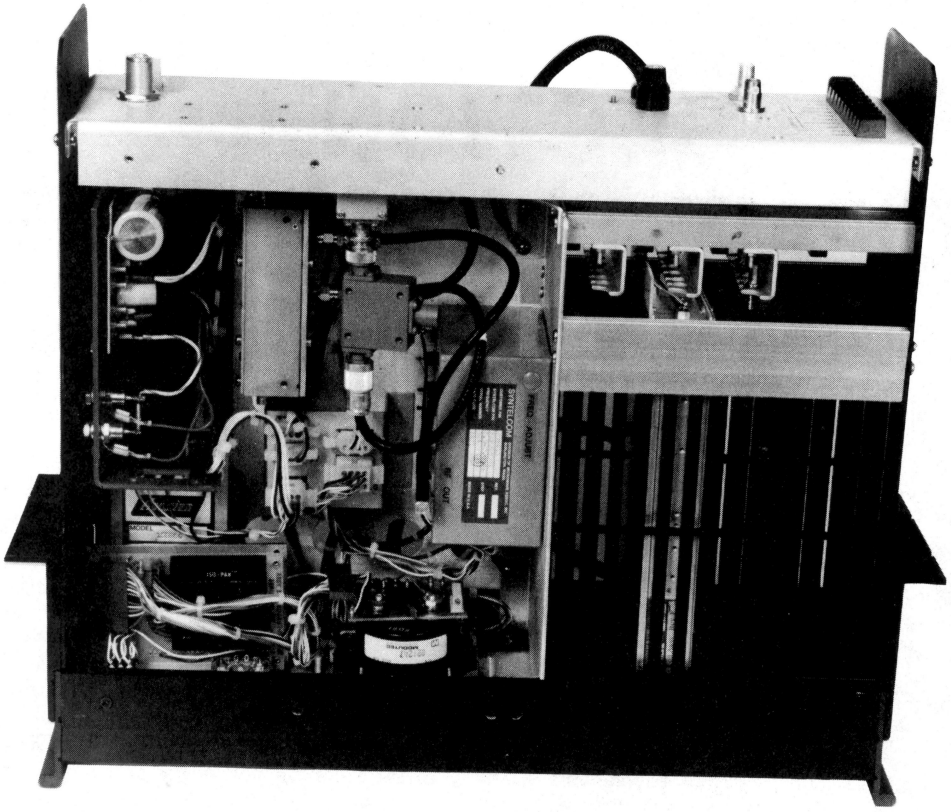


Figure 1-2. MA-2GUX Receiver - Top View

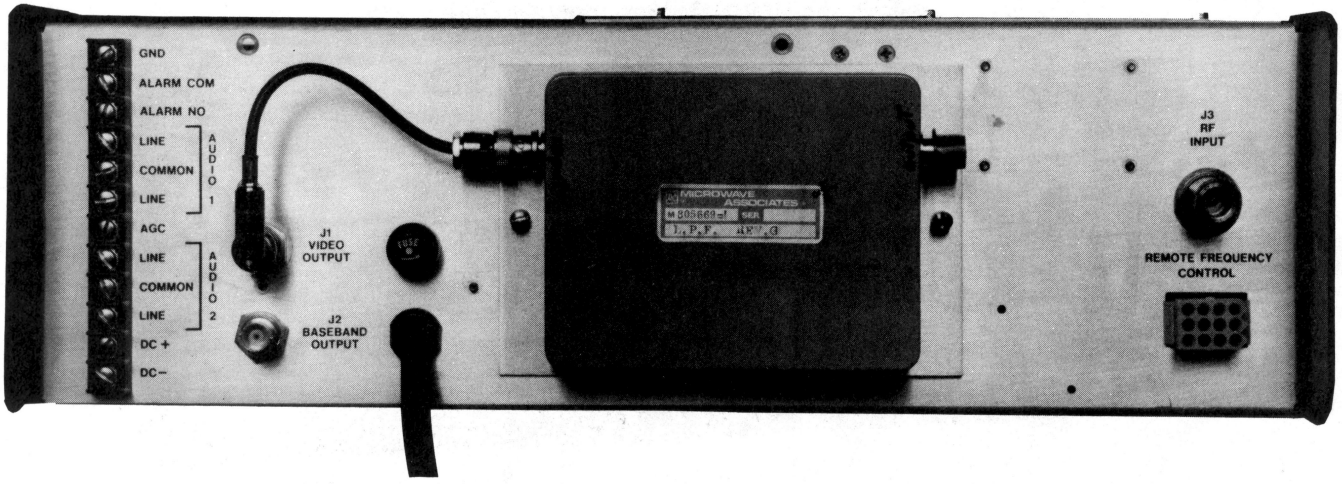


Figure 1-3. MA-2GUX Receiver - Rear View

SPECIFICATIONS

GENERAL

Type	single conversion, superheteordyne
Radio Capacity	525/625 line video plus two audio channels
Frequency Band	1.990 to 2.110 GHz
RF Channels	21 channels (7 basic channels with offset)
RF Bandwidth	120 MHz
Local Oscillator Stability	±0.005%
Preamp Noise Figure	3 dB maximum; 2.5 dB typical
Band Filter Loss	−1 dB maximum
Overall Receiver Noise Figure	4 dB maximum; 3.5 dB typical
IF Frequency	70 MHz center
IF Bandwidth	
Standard	20 MHz
Optional	10 or 30 MHz
Video Outputs	two: one video and one composite baseband
Level	1V P-P for ±4 MHz deviation
Impedance	75 ohms
Subcarrier Frequencies	4.83, 6.2, 6.8, 7.5 or 8.59 MHz
Audio Output	
Level	
Standard	0 to +9 dBm adjustable
Optional	0 to +18 dBm adjustable
Impedance	600 ohms balanced

AUDIO PERFORMANCE

Frequency Response	
50 Hz and 15 kHz	−1 dB maximum
100 Hz to 10 kHz	±0.5 dB
Harmonic Distortion	1% maximum at 75 kHz peak deviation
Signal-to-Noise Ratio*	60 dB minimum

PHYSICAL

Size	19″ (w) x 15 1/8″ (d) x 5.25″ (h) (48.3 x 38.4 x 13.3 cm)
Weight	28 lbs. (12.7 kg)

VIDEO PERFORMANCE

Video Signal-to-Noise (CCIR Weighted, 525/625 Line)	
10 kHz to 5 MHz	70 dB
Signal-to-Hum (P-P/RMS)	60 dB
Frequency Response	
Composite Output (10 kHz to 8 MHz)	
20 and 30 MHz IF	±0.5 dB
Filtered Output	
4.5 MHz	
10 kHz to 4 MHz (10 and 20 MHz IF)	±0.5 dB
5.0 MHz	
10 kHz to 4.5 MHz	±0.5 dB
5.5 MHz	
10 kHz to 5.0 MHz	±0.5 dB
Field Wave Tilt	3 IRE units
Differential Phase	
10 MHz IF	3°
20 MHz IF	0.5°
30 MHz IF	0.3°
Differential Gain	
10 MHz IF	5%
20 and 30 MHz IF	2%

ENVIRONMENTAL

Ambient Temperature	
Operational	−20 to +40°C
Meets All Specs	0 to +40°C
Relative Humidity	up to 95% (0 to +40°C)
Elevation	
Operational	15,000 feet (4,500m)
Storage	50,000 feet (15,000m)

PRIMARY POWER

Input Voltage	115 Vac (50 to 60 Hz)
Power Consumption	100W maximum

*Reference TT Level, RMS/RMS, Pulse bar video test signal subcarrier.

All specifications are subject to change without notice.

SECTION 2
THEORY OF OPERATION

SCOPE

This section contains the technical descriptions of the various modules and circuits which comprise the Receiver. A funtional block diagram is shown in Figure 2-1.

LNA

The incoming signal is preamplified by a FET Low Noise Amplifier (LNA). The LNA has a maximum noise figure (NF) of 3 dB and approximately 12 dB gain. The LNA is **not** customer repairable. Therefore, a detailed schematic of this module is not included in this manual.

BANDPASS FILTER

The LNA is followed by a 2 GHz Bandpass Filter. The filter rejects out-of-band signals, thereby preventing their introduction into the mixer.

ISOLATOR

An Isolator is incorporated within the Bandpass Filter. The Isolator is a directional device which presents proper termination to the Bandpass Filter.

MIXER ASSEMBLY

The Mixer Assembly converts the RF input signal down to the Receiver's 70 MHz intermediate frequency in the Mixer-Preamplifier stage that consists of a stripline balanced Mixer with matched Schottky barrier diodes and an IF Preamplifier circuit. This unit has a high dynamic range to prevent intermodulation during the reception of high amplitude RF signals.

The filtered RF input signal is applied to one Mixer-Preamplifier port while the LO signal is applied to the second input port. The LO signal is 70 MHz below the locally or remotely selected channel frequency.

The two signals are heterodyned in the Mixer and the resultant 70 MHz IF signal is supplied from the Mixer to the IF Preamplifier circuit. This results in a 15 dB RF to IF gain across the Downconverter.

LOCAL OSCILLATOR

SYNTHESIZER. The Synthesizer employs a digital frequency synthesizing system comprised of high speed digital integrated circuit elements that provide phase lock loop (PLL) control of a tunable RF source.

Synthesizer controls are located on the Receiver's front panel. These include a CHANNEL SELECTOR switch that selects one of seven preprogrammed frequencies and an offset control.

The offset control offsets the carrier above (+) or below (−) the channel frequency by 4.25 MHz to minimize adjacent channel interference in congested areas.

This module is a factory serviceable unit that is considered a proprietary item. Therefore, a detailed description of its operation is not supplied.

IF PREAMPLIFIER. The 70 MHz signal from the Mixer is coupled through C3 and C4 to the base of the common emitter amplifier Q1. Diodes CR1 and CR2 provide temperature compensation for the base emitter junction in Q1 insuring constant amplification over a wide temperature range. The collector output of Q1 is broadly resonated before being ac coupled via C11 to the base of common emitter amplifier Q2. Amplifier Q2 is directly coupled to Q3. Amplifier Q3 is in the common collector configuration (emitter-follower); it provides output impedance matching. Variable capacitor C8 provides high frequency peaking of the 70 MHz IF signal. Flatness adjustments are made by C10 and C17 is the return loss adjustment.

IF FILTER EQUALIZER

30 MHz. The IF filter and Equalizer module receives its signal from the IF Preamplifier and after filtering and correcting the delay, sends the signal to the IF AGC Amplifier.

IF Filter is a 5-section LC Bandpass Filter consisting of inductors L1 through L5 and capacitors C1 through C6. The filter is comprised of LC shunt sections resonantly inductor tuned to a center frequency of 70 MHz with a bandwidth of +15 MHz. The all-pass equalizer network uses a variable center frequency to compensate for the inherent IF Filter parabolic delay. Its phase response is inverse to the normal IF Filter response.

20 MHz. The 20 MHz IF Filter/Equalizer comprises a 20 MHz Bandpass Filter which has input and output amplifiers and a separate phase equalizer.

12 MHz. The 12 MHz IF Filter/Equalizer comprises a 12 MHz Bandpass Filter which has input and output amplifiers and a separate phase equalizer.

IF AGC AMPLIFIER

The IF AGC Amplifier provides the majority of signal amplification in the Receiver. Automatic gain control maintains a constant IF output level over a wide range of input levels, tracking rapid signal changes that can occur as a result of atmospheric conditions between the Transmitter and Receiver sites. A meter output is provided for monitoring the incoming IF level.

Signal amplification is provided by four hybrid integrater circuits and an output amplifier. Overall gain is regulated by three voltage-controlled attenuators.

The IF output signal is filtered, then rectified by the level detector and compared to a fixed dc reference voltage. Any deviation from a preset level is amplified by the error amplifier. The time-constant of this amplifier determines the speed with which the circuit tracks varying IF input levels.

The output of the error amplifier is applied to an antilogarithmic amplifier and to a meter amplifier. The antilog characteristic complements the attenuator characteristic, so that the output of the error amplifier is more nearly a linear function of IF input level. This provides a convenient voltage for driving the meter amplifier.

The output from the antilog amplifier is applied to the attenuator drivers and the boosted dc voltages control the insertion loss of the attenuators.

The squelch circuit detects excessive noise in the signal and amplifier Q5 powers the squelch alarm switch. The AGC alarm detects a drop in the signal below the AGC threshold and amplifier Q4 triggers the AGC alarm located on the back terminal board (TB1).

VIDEO DEMODULATOR

The 70 MHz IF signal enters the module at a subminiature coaxial connector (IF IN) on top of the module. The incoming IF signal is fed to a 70 MHz amplifier stage formed by transistors Q1 and Q2 which drives the limiter. Limiter diodes CR1 through CR4 suppress any amplitude modulation on the IF signal and feeds it to another 70 MHz amplifier stage, Q3 and Q4, which drives the discriminator circuit. The discriminator is a conventional, dual-tuned circuit that recovers the modulating intelligence. Discriminator diodes CR5 and CR6 detect the instantaneous frequencies near the resonant frequency of their respective tuned circuits. At the center frequency, conduction through the diodes is equal and the net output is 0V. Below 70 MHz, the voltage across CR5 is greater and the net output is positive. Conversely, above 70 MHz, the voltage across CR6 is greater and the net output is negative.

Resistors R18 and R23 pick off the dc from the discriminator and feed integrated circuit meter amplifier U1 which drives the discriminator meter. Variable resistor R68 sets the meter "center." The output of the discriminator drives a baseband amplifier stage Q5 through Q7. Variable capacitor C18 shapes the baseband frequency response of this stage. The output from Q7 drives the de-emphasis network. The 525 (optional 625) line video de-emphasis network is installed with characteristics inverse to emphasis introduced at the Transmitter terminal to produce a flat system response. De-emphasis network adjustments are provided by R37, while DIP switch S1 is used to disable the de-emphasis network for testing purposes.

The output from the de-emphasis network is fed to an emitter follower Q8 which drives the video amplifier stage formed by transistors Q13 through Q18. Variable resistor R55 adjusts the gain of the amplifier to produce a 1V P-P video output. The video amplifier produces three isolated outputs at the rear of the module.

The first output is sent through a Video Low Pass Filter to remove the higher frequency audio subcarriers that are present on the baseband signal to produce a "clean" video signal. The other two outputs are an unfiltered, composite output (video plus audio subcarriers), and a subcarrier output.

VIDEO DEMODULATOR ADDITION

The output is tapped by a clamper circuit which serves to remove tilt from the video signal and clamp the video waveforms baseline to ground. The clamper has an ON-OFF switch located on the front of the Video Demodulator module.

The output is fed through a Low Pass Filter comprised of C24, C47, R86 and R87 to remove the high frequency energy and feed only the sync signal to the sync separator circuits formed by integrated circuits U3 and U4. The output from U3 is a pulse that is delayed slightly from the sync signal and is then differentiated by C30 and R50. This sharp pulse is then amplified by transistor Q11 and fed to the gate of field effect transistor Q22 which turns on the servo loop at the proper time to achieve clamping.

AUDIO DEMODULATOR PN 807548 (OPTIONAL)

The incoming subcarrier signal, at connector J1, is buffered by a Source Follower which presents a high input impedance to the video line. The signal then passes through the Subcarrier Bandpass Filter which rejects both the baseband video and other subcarriers. The Subcarrier Amplifier compensates for insertion losses incurred in the Bandpass Filter circuit. From the output of the Subcarrier Amplifier the subcarrier signal couples to two inputs simultaneously. One input is applied to the Carrier Operated Relay (COR) Driver Amplifier and the other input to the Limiter Detector circuit.

The COR Driver Amplifier stage amplifies the subcarrier to a level sufficient to drive the Carrier Detector circuit. The resultant dc level is applied to a level detector associated with the Carrier Detector. An insufficient subcarrier level or absence of a subcarrier will cause the Fault Relay to be de-energized and causes the fault light to illuminate.

The Limiter Detector circuit recovers the audio information from the subcarrier signal applied to its input. The audio information is then applied to a Low Pass Filter circuit which shapes the audio noise bandwidth and also filters the RF detection ripple from the FM detector.

The audio information from the Low Pass Filter is applied to a 15.734 kHz Notch Filter where any and all extraneous video horizontal scanning is removed. From the Notch Filter circuit, the audio information couples through the De-Emphasis Network. The resultant audio information via the audio level control is amplified by the line driving Audio Output Amplifier which provides a balanced drive to a balanced 600 ohm load.

AUDIO DEMODULATOR PN 807926 (OPTIONAL)

The incoming signal is received at coaxial connector J1 and is sent to preamplifier stage Q1 where the video and subcarrier components become amplified and are routed through a bandpass filter before being fed into the Mixer stage Q3.

The Local Oscillator circuit consisting of piezoelectric crystal Y1, transistor Q2, and associated components, generates a stable RF signal that is 10.7 MHz above the subcarrier frequency. The LO signal is applied to the Mixer stage Q3 where it is mixed with the incoming subcarrier. These signals are heterodyned producing sum and difference frequencies at Q3. The 10.7 MHz selected frequency is used as the IF frequency to the IF Filter where the proper IF bandwidth is established. This signal passes through the IF filter into the IF Amplifier U1.

IF Amplifier U1 has three outputs one of which is coupled to diodes CR2 and CR3 which form a peak detector of the IF signal. This peak detector is routed back to Mixer stage Q3 where it serves to set the gain of the Mixer. The second output of U1 flows into an additional low level peak detector formed by diodes CR4 and CR5. This peak detector develops a dc voltage proportional to the 10.7 MHz IF signal and this voltage enters DC Amplifier Q4, and is sent through the AGC logic adjustment potentiometer R30, into the AGC Level Sensor U2. The AGC Level Sensor U2 senses the level of the AGC signal and provides the logic circuitry that is necessary to operate switching transistors Q5 and Q6 which power the fault circuitry.

The amplified 10.7 MHz signal is also fed into the FM Quadrature Detector U3. The signal is then passed through a Low Level Audio Amplifier Q13 and into a Low Pass Filter. The audio signal then goes through the 15.734 kHz Notch Filter and into the De-Emphasis Network to the Level Adjust potentiometer R70. The signal is then routed to terminal board TB1 located on the rear of the receiver chassis through output amplifiers Q15 through Q18, U4A, and U4B.

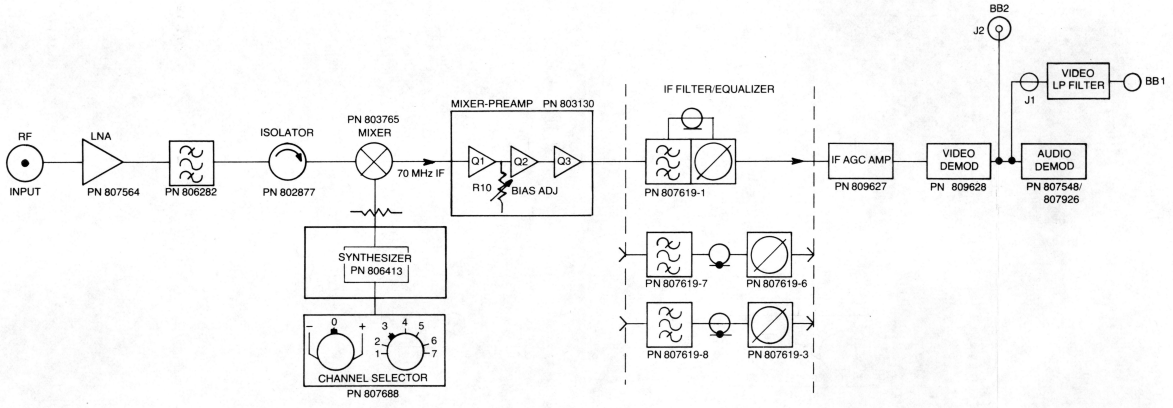


Figure 2-1. MA-2GUX Receiver - Functional Block Diagram (Sheet 1 of 4)

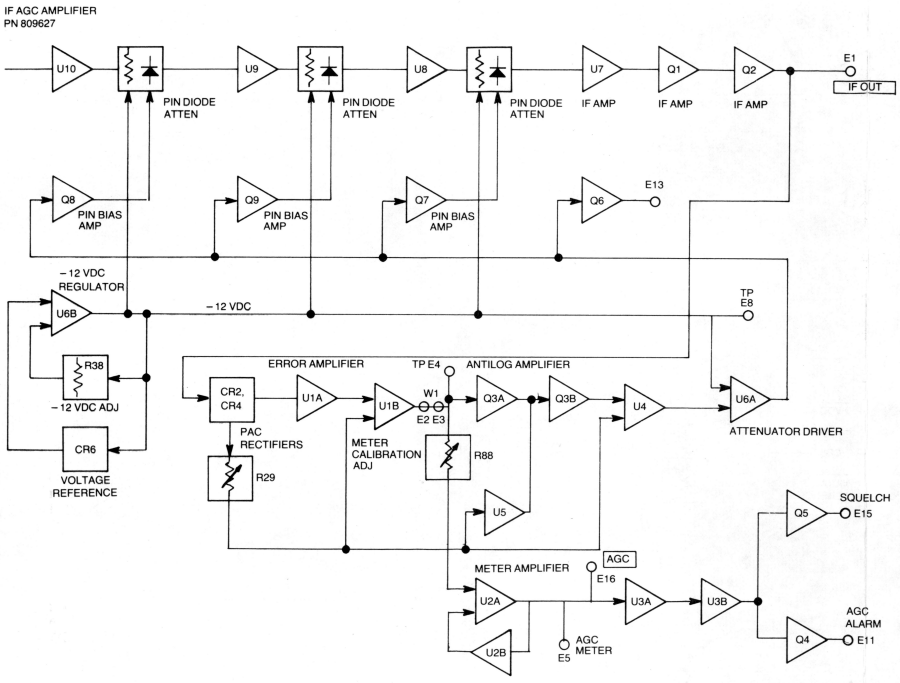


Figure 2-1. MA-2GUX Receiver - Functional Block Diagram (Sheet 2 of 4)

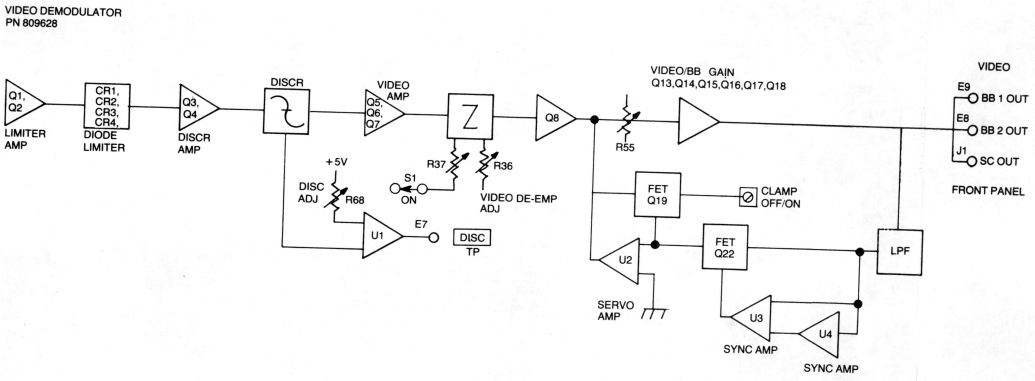


Figure 2-1. MA-2GUX Receiver - Functional Block Diagram (Sheet 3 of 4)

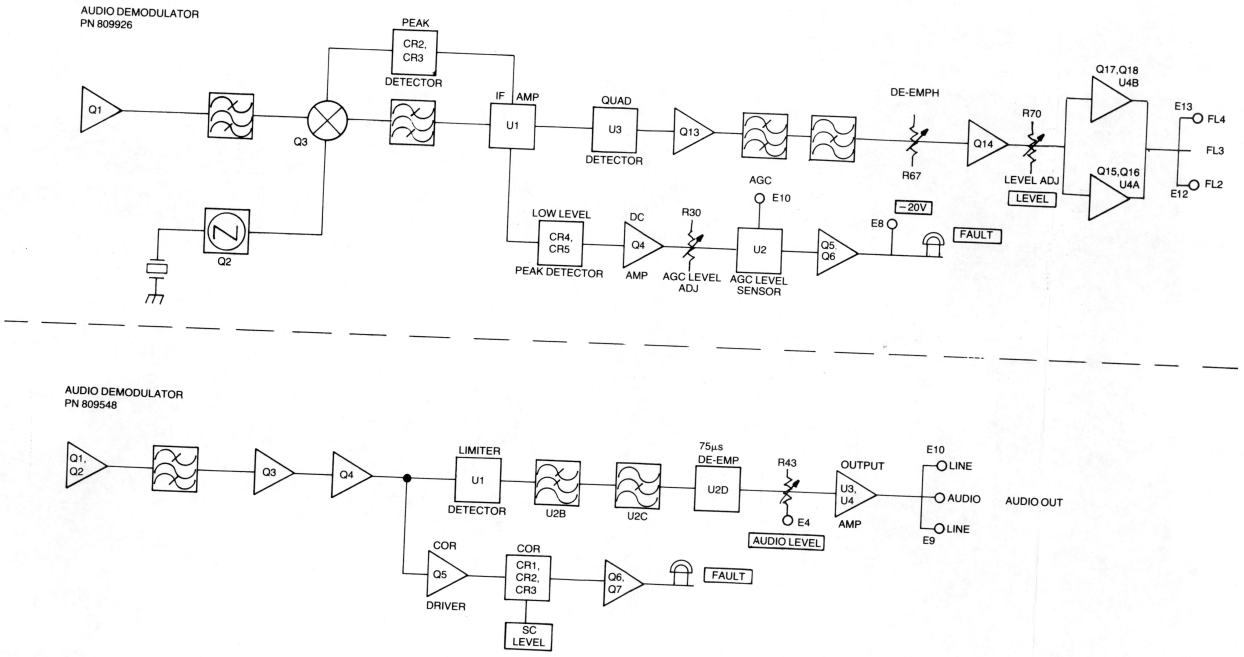


Figure 2-1. MA-2GUX Receiver - Functional Block Diagram (Sheet 4 of 4)

SECTION 3
INSTALLATION

SCOPE

This section describes the general installation practices that apply to the MA-2GUX Receiver. It includes unpacking, installation of equipment and the necessary mechanical and electrical considerations. Prior to installation, overall system designs should be consulted.

UNPACKING AND HANDLING

UNPACKING. Each unit is shipped with all equipment assembled, wired, factory-system tested, and then packaged in appropriate shipping containers.

Care shall be taken when removing equipment from the container to prevent damage to the units. Ensure that all parts and accessories are removed from the container and packing material before they are discarded. Verify that equipment shipped agrees with the equipment list and sales order.

DO NOT discard the container or any packing material until mechanical inspection has been satisfactorily completed. This material must be available if a damage claim is made with the carrier.

MECHANICAL INSPECTION. Inspect the equipment for shipping damage. Make sure that the equipment is clean, and no wires, cables or connectors are broken, damaged or loose.

NOTE

DO NOT operate any internal controls as the equipment has been factory adjusted for proper operation prior to shipment and may need only minor adjustment before being placed in service.

DAMAGE IN SHIPMENT. Should any damage be discovered after unpacking the system, immediately file a claim with the carrier. A full report of the damage shall be made and a copy forwarded to M/A-COM Video Systems, Inc. The company will then advise what disposition is to be made of the equipment.

RETURN AUTHORIZATION. Subject to standard terms of the warranty policy, M/A-COM Video Systems, Inc. will repair all defective equipment or component modules at its Burlington, Massachusetts factory.

Material forwarded to M/A-COM Video Systems, Inc. must be accompanied by a Return Authorization Tag which is available on request.

INSTALLATION

The receiver comes as a self-contained unit which is ready to mount in a standard EIA rack. The unit will take up 3 rack sections.

INSTALLATION PRACTICES

RECEIVER AGC VS RECEIVED CARRIER LEVEL (RCL). Figure 3-1 depicts an AGC vs RCL characteristics curve of a typical Receiver.

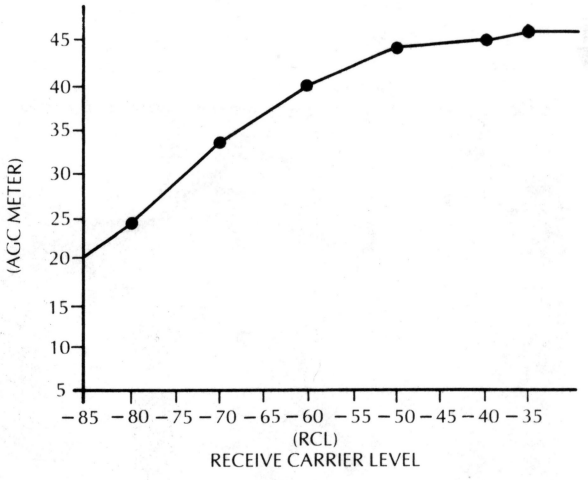


Figure 3-1. Typical Receiver – Receiver AGC vs Received Carrier Level (RCL)

PRECAUTIONS

Adherence to the initial installation precautions outlined in Table 3-1, will help prevent problems arising during operation and future maintenance of the MA-2GUX Receiver.

SIGNAL AND POWER CONNECTIONS

All signal and power connections are provided at the rear of the Receiver chassis (Figure 3-2). Connect the terminals and signal cables as necessary for video and baseband outputs, RF and remote frequency control. Note that the AGC alarm is available on the terminal board (TB1).

Table 3-1. Installation Precautions

PRECAUTION	REQUIREMENT
Ensure easy access to rack wiring.	Allow a minimum of 18 inches clearance behind the equipment rack(s).
Facilitate servicing and maintenance.	Allow minimum of 36 inches clearance in front of equipment rack(s).
Avoid direct heating or air conditioning.	If unavoidable, use deflector plates.
AC power source outlets.	Locate equipment near sufficient outlets to provide power for test equipment and power tools.
Rack support.	Make certain rack supports are sufficiently rigid to support rack(s).
Building leakage.	Beware of dripping water onto equipment from leaky roofs, waveguide roof entries, and cold water pipe condensations.

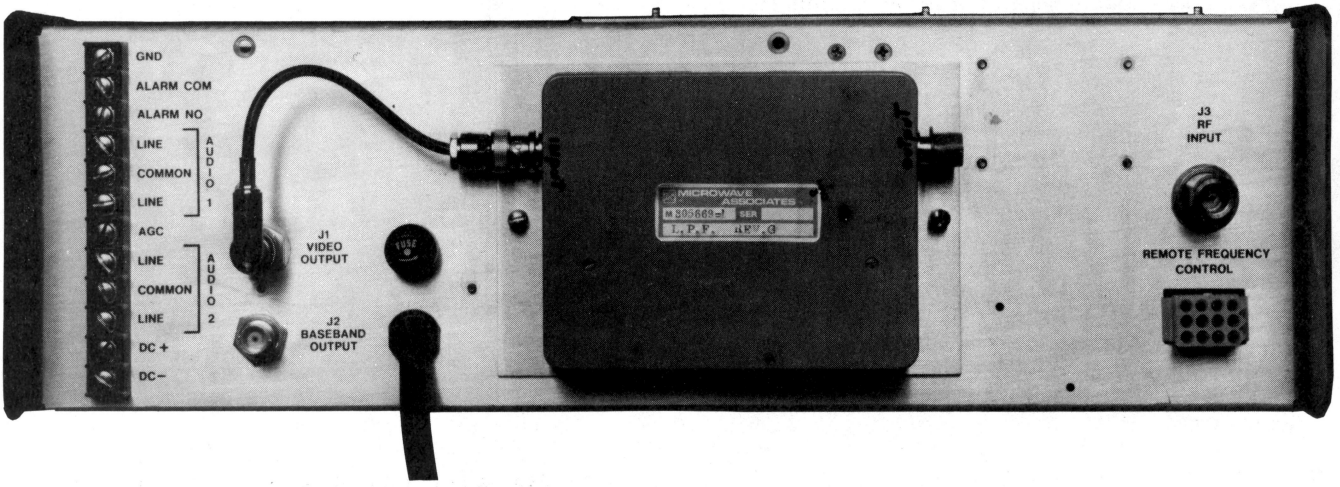


Figure 3-2. MA-2GUX Receiver - Rear View

ALARMS

The alarm functions are available at terminal board TB1, located at the rear of the Receiver chassis.

The alarm relay is normally open (de-energized) under normal operation. The relay is energized under fault conditions activating an alarm and/or illuminating a lamp.

Also, if power is lost, the alarm and/or lamp will be activated.

VIDEO AND BASEBAND OUTPUT SIGNALS

The video output and baseband output coaxial connections are provided at the rear of the Receiver chassis.

AUDIO OUTPUT SIGNAL

The audio output signals are available at the terminal board TB1 located at the rear of the Receiver chassis.

ANTENNA CONNECTION

The RF input connector (Type N) located at the rear of the Receiver chassis provides the means for connection of the Receiver to the antenna. The antenna connections are made with a short section of flexible cable to the station antenna runs. The flexible cable will prevent movement, tension, and vibration from affecting the equipment. The Receiver AGC voltage is available at terminal board TB1 pin 7 for monitoring purposes.

REMOTE CONTROL INTERFACE

The remote control interface Elco connector is provided at the rear of the chassis.

POWER CONNECTIONS

The line power for the equipment enters the MA-2GUX Receiver through the ac power cord. The ac line power operates the regulated -20 Vdc and $+15$ Vdc Power Supply.

Fuse F1 located at the rear of the chassis protects the internal Power Supply and input power source.

The MA-2GUX Receiver will be activated when the unit is plugged into the ac line. Due to the continuous nature of the Receiver operation, an ON-OFF switch is not included in the Receiver.

SECTION 4
OPERATING INSTRUCTIONS

SCOPE

This section describes the operating controls and indicators of the Receiver (Figure 4-1) and contains the initial turn-on procedures for the equipment.

The operating controls and indicators for the Receiver are listed in Table 4-1.

Table 4-1. Operating Controls and Indicators.

CONTROL	LEGEND	FUNCTION
Meter M1		Meter M1 provides current indications from zero (left) to + 50 for the designated positions of the Meter Switch when the Meter Switch is set to any of the four positions provided, indications on Meter M1 are as follows.
Meter Switch (a 4 position pushbutton selector switch)	LO MON	Meter should indicate greater than + 10 indicating that LO drive is present at the Mixer input in the first downconverter.
	+ 15V	Meter should indicate + 15 indicating that the + 15V Power Supply is operating normally.
	− 20V	Meter should indicate + 20 indicating that the + 20V Power Supply is operating normally.
	AGC	Meter should indicate at the AGC level corresponding to the received carrier level (final test data supplied with equipment).
Switches	LOCAL/REMOTE	Selects either Local or Remote mode of Local Oscillator frequency to the Mixer stage in the first downconverter.
	CHANNEL SELECTOR	Selects one of seven basic channels.
	OFFSET (− ,0, +)	Offsets carrier above (+) or below (−) channel frequency for 21 channel operation.
Test Point	AGC	External meter monitoring of AGC signal.
Test Point	+ 15V	External meter monitoring of + 15V Regulator circuit.
Test Point	− 20V	External meter monitoring of − 20V Regulator circuit.
Test Point	GND	External meter grounding point.
Connector	IF OUT	Subminiature coaxial connector to connect 70 MHz output signal to video demodulator module.
	NOTE A subminiature coaxial connector located at rear of module provides for connection of 70 MHz IF input from Mixer Preamplifier.	

Table 4-1. Operating Controls and Indicators (Cont.)

CONTROL	LEGEND	FUNCTION
VIDEO DEMODULATOR		
Test Point	DISC	External meter monitoring of DISC signal.
Test Point	−20V	External meter monitoring of −20V regulator circuit.
Test Point	+5V	External meter monitoring of +5V regulator circuit.
Test Point	+15V	External meter monitoring of +15V regulator circuit.
Test Point	GND	External meter grounding point.
Adjustment	CLAMPER OFF/ON	Turns clamper circuit off or on.
Adjustment	VIDEO GAIN	Sets the video gain.
Connector	IF IN	Connections of IF input signal from IF Amp.
Connector	SC OUT	Connection of audio subcarrier signal to subcarrier demodulator module.
SUBCARRIER DEMODULATOR PN 807926 (OPTIONAL)		
Test Point	AGC	External meter monitoring of subcarrier AGC level.
Test Point	−20V	External meter monitoring of −20V supply voltage.
Test Point	GND	External meter grounding point.
Adjustment	LEVEL	Sets audio output level at +9 dBm connection of audio subcarrier input.
Connector	J1	Signal from Video Demodulator module. Connection of audio subcarrier input.
Connector	J2	Signal from Video Demodulator module.
Indicator LED, Red	FAULT	Lights when audio subcarrier level falls below preset threshold.
SUBCARRIER DEMODULATOR PN 807548 (OPTIONAL)		
Test Point	AGC	External meter monitoring of subcarrier AGC level.
Test Point	+12V	External meter monitoring of +12V Regulator Circuit.
Test Point	GND	External meter grounding point.
Adjustment	LEVEL	Sets audio output level at +9 dBm.
Indicator LED, Red	FAULT	Lights when audio subcarrier falls below preset threshold.
Connector	J1	Connection of audio subcarrier input signal from Video Demodulator module.
Connector	J2	Connection of audio subcarrier input signal from Video Demodulator module.

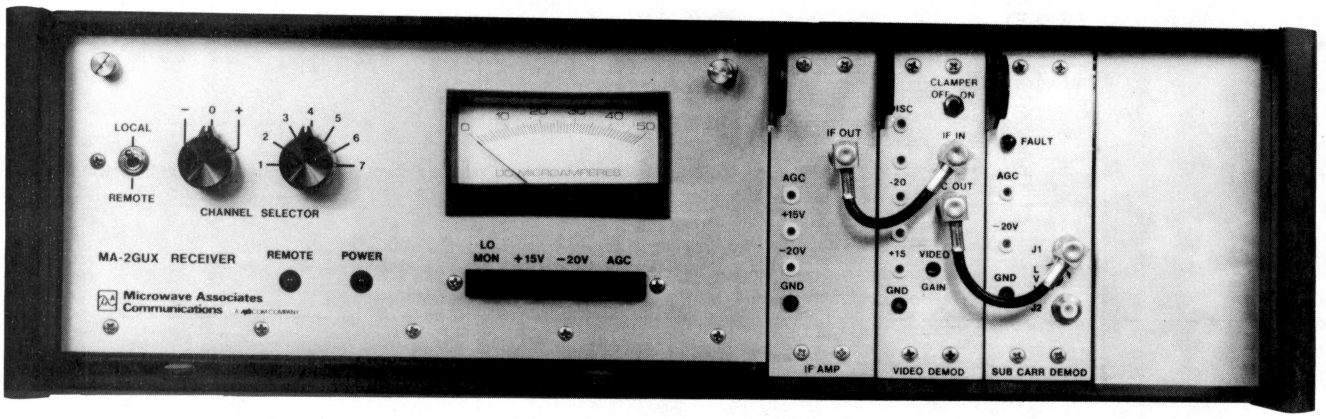


Figure 4-1. MA-2GUX Receiver - Front View

INITIAL TURN-ON PROCEDURE

The following is the procedure for initial turn-on of the MA-2GUX Receiver. It will be assumed that the antennas are aligned and the other end of the hop is operational.

Step 1. Verify that the primary power is available and correct at the interface.

Step 2. Connect or switch the primary power on and make certain that the red power indicator on the front panel lights up.

Step 3. Set the Local/Remote toggle switch to Local.

Step 4. Use the front panel selector switches to select the desired frequency (Table 4-2). Note that the center (zero) position of the offset switch is for basic seven channel operation.

Step 5. Record the current meter readings by depressing each pushbutton switch in turn and compare the readings with Table 4-3.

Step 6. Using a VOM, record front panel test voltages according to Table 4-4 and refer to final test data sheet.

Table 4-2. U.S. Broadcast Band Frequencies

SELECTOR SWITCH POSITION	FREQUENCIES		
	− OFFSET	0 CENTER	+ OFFSET
1	1994.75	1990.00	2003.25
2	2012.25	2016.50	2020.75
3	2029.25	2033.50	2037.75
4	2046.25	2050.50	2054.75
5	2063.25	2067.50	2071.75
6	2080.25	2084.50	2088.75
7	2097.25	2101.50	2105.75

Table 4-3. Current Meter Reading Limits

PUSHBUTTON SWITCH	LIMITS		REMARKS
	MIN	MAX	
LO MON	10		See Note
+15V	14	16	
−20V	19	21	
AGC			See Note

NOTE

Since meter readings vary from unit to unit, a final test data sheet is provided with each Receiver, showing readings taken during final test.

Table 4-4. Front Panel Test Point Measurement Data

TEST POINT	TEST EQUIPMENT CONNECTION	NORMAL INDICATION	REMARKS
IF AMPLIFIER			
AGC	VOM Between AGC and GND		AGC voltage is made available for detailed tests if required.
+15V	VOM between +15V and GND	+15±	
−20V	VOM between −20V and GND	−20±	
VIDEO DEMODULATOR			
DISC	VOM between Disc and GND		70 MHz value given on test data.
−20V	VOM between −20V and GND	−20±0.5	
+5V	VOM between +5V and GND	+5±0.25	
+15V	VOM between +15V and GND	+15±0.5	
SUBCARRIER DEMODULATOR (STANDARD)			
AGC	VOM between AGC and GND		
+12V	VOM between +12V and GND	+12±0.5	
SUBCARRIER DEMODULATOR (ALTERNATE)			
AGC	VOM between AGC and GND		
−20V	VOM between −20V and GND	−20±0.5	

SECTION 5
MAINTENANCE AND TROUBLESHOOTING

GENERAL

Maintenance includes both preventive and corrective maintenance.

Preventive maintenance consists of the semi-annual and annual procedures adopted to prevent minor problems from developing into major breakdowns. Initiate and carry out a preventive maintenance schedule which checks system operation and exercises all control functions to avoid malfunction occurrence. This insures optimum system performance.

Corrective maintenance is indicated when a fault or impairment to normal operation is noted. Troubleshooting procedures will isolate the fault to a subsystem or unit. Repair, replacement or adjustment of the subsystem or unit will correct the fault to restore normal operation.

MAINTENANCE LOG. Record measurements and corrective action taken in a maintenance log as reference information for use in future alignment, maintenance and troubleshooting.

NOTE

FCC Rules and Regulations mandate that whenever measurements or adjustments are performed that may effect the frequency, power or modulation of the radio system, pre- and post-measure measurements of the latter must be entered in the FCC Radio Station Log. Also, a log entry must be made anytime the Transmitter is removed from service or restored to service.

Measurements or adjustments that require turning RF ON or OFF or which may affect frequency, power or modulation must be performed only under the supervision of an FCC licensed Radiotelephone Operator, 1st or 2nd Class. Other measurements such as meter readings or test point measurements may be conducted by unlicensed personnel.

PREVENTIVE MAINTENANCE

Preventive maintenance is the systematic care,servicing, and inspection of equipment to prevent occurrence of trouble, to reduce downtime, and to maintain the equipment in serviceable condition. Preventive maintenance procedures are normally performed semi-annually and annually; specific procedures are provided herein. The semi-annual checks should be also performed when the equipment is initially installed and when the equipment is reinstalled after removal for any reason.

PERIODIC MAINTENANCE. On a semi-annual basis, station personnel should record, in a maintenance log, the normal measurements of equipment operating parameters so that equipment performance overtime may be monitored. A comparison of the measurements entered in the maintenance log is a means of determining any long-period changes in equipment performance. M/A-COM Video Systems, Inc. does not recommend periodic adjustment to the equipment. If operating policy requires the operational checks be made on a periodic basis, these checks should be limited to those which do not unnecessarily alter equipment adjustments. Adjustments should be made only in the event that the equipment fails to meet performance specifications. The periodic maintenance log should be examined to determine whether any failure that occurs is gradual or catastrophic. If the failure is of an abrupt nature, refer to the troubleshooting procedures before readjusting the equipment.

SEMI-ANNUAL CHECKS. If the equipment is in continuous use, perform only those steps that do not interfere with the equipment operation.

1. EXTERIOR SURFACES. Clean outside of case and front panel.

2. CABLE CONNECTIONS. Check all cable connections and finger-tighten if necessary.

3. MEASUREMENTS. Measure Transmitter operating parameters and record the readings in the maintenance log. Any variance from previous measurements should be investigated.

ANNUAL CHECKS. Perform the following checks on an annual basis. If the equipment is in continuous use, perform only those steps that do not interfere with equipment operation.

1. HARDWARE. Tighten loose screws and replace missing hardware as required.

2. INDICATOR LAMPS. Check and replace if defective.

3. CABLES. Inspect for wear and fraying, and repair if necessary. Replace cable assemblies in which wiring installation or connectors are damaged.

4. PAINTED SURFACES. Clean, and if necessary, paint bare metal spots, blistered, pitted or flaking areas.

5. ANTENNAS AND TOWERS. Check mounting hardware and guy wires. Tighten or replace as necessary.

MEASUREMENT CONVERSIONS

A dBmV-to-dBm-to-μV conversion chart (Table 5-1) is provided to allow the user to convert any measurements listed herein to those his test equipment is calibrated in.

MEASUREMENTS AND ADJUSTMENTS

Measurement and adjustment procedures for the Receiver are outlined below. A list of recommended test equipment appears in Table 5-2.

Test equipment operating instructions are not included herein except for precautionary notes. Equivalent test equipment may be substituted if necessary. All test cables should be as short as possible, all impedances should be matched, and terminations correctly located.

NOTE

If difficulty is experienced in obtaining the proper performance during any adjustment, the test equipment (including all cables and terminations) should be disconnected and tested to determine whether the test setup is contributing to the system performance readings in any manner.

Table 5-1. Measurement Conversions (dBmV-to-dBm-to-μV) – 75 Ohms

dBmV	dBm	μV	dBmV	dBm	μV	dBmV	dBm	μV	dBmV	dBm	μV
–60	–109	1.00	–25	–74	56.23	10	–39	3,162	45	– 4	177,800
–59	–108	1.12	–24	–73	63.10	11	–38	3,548	46	– 3	199,500
–58	–107	1.26	–23	–72	70.79	12	–37	3,981	47	– 2	223,900
–57	–106	1.41	–22	–71	79.43	13	–36	4,467	48	– 1	251,200
–56	–106	1.58	–21	–70	89.13	14	–35	5,012	49	0	281,800
–55	–104	1.78	–20	–69	100.00	15	–34	5,623	50	+ 1	316,200
–54	–103	1.99	–19	–68	112.20	16	–33	6,310	51	+ 2	354,100
–53	–102	2.24	–18	–67	125.90	17	–32	7,079	52	+ 3	398,100
–52	–101	2.51	–17	–66	141.30	18	–31	8,913	54	+ 5	446,700
–51	–100	2.82	–16	–65	158.50	19	–30	8,913	54	+ 5	501,200
–50	– 99	3.16	–15	–64	177.80	20	–29	10,000	55	+ 6	562,300
–49	– 98	3.55	–14	–63	199.50	21	–28	11,220	56	+ 7	631,000
–48	– 97	3.98	–13	–62	223.90	22	–27	14,130	58	+ 9	794,200
–47	– 96	4.47	–12	–61	251.20	23	–26	14,130	58	+ 9	794,200
–46	– 95	5.01	–11	–60	281.80	24	–25	15,850	59	+10	891,300
–45	– 94	5.62	–10	–59	316.20	25	–24	17,780	60	+11	1,000,000
–44	– 93	6.31	– 9	–58	354.80	26	–23	19,950	61	+12	1,122,000
–43	– 92	7.08	– 8	–57	398.10	27	–22	22,390	62	+13	1,259.000
–42	– 91	7.94	– 7	–56	446.70	28	–21	25,120	63	+14	1,413,000
–41	– 90	8.91	– 6	–55	501.20	29	–20	28,180	64	+15	1,585,000
–40	– 89	10.00	– 5	–54	562.30	30	–19	31,620	65	+16	1,778,000
–39	– 88	11.22	– 4	–53	631.00	31	–18	35,480	66	+17	1,995,000
–38	– 87	12.59	– 3	–52	707.90	32	–17	39,810	67	+18	2,239,000
–37	– 86	14.13	– 2	–51	794.30	33	–16	44,670	68	+19	2,512,000
–36	– 85	15.85	– 1	–50	891.30	34	–15	50,120	69	+20	2,818,000
–35	– 84	17.78	0	–49	1,000.00	35	–14	56,230	70	+21	3,162,000
–34	– 83	19.95	1	–48	1,122.00	36	–13	63,100	71	+22	3,548,000
–33	– 82	22.39	2	–47	1,259.00	37	–12	70,790	72	+23	3,981,000
–32	– 81	25.12	3	–46	1,413.00	38	–11	79,430	73	+24	4,467,000
–31	– 80	28.18	4	–45	1,585.00	39	–10	89,130	74	+25	5,012,000
–30	– 79	31.62	5	–44	1,778.00	40	– 9	100,000	75	+26	5,623,000
–29	– 78	35.48	6	–43	1,995.00	41	– 8	112,200	76	+27	6,310,000
–28	– 77	39.81	7	–42	2,239.00	42	– 7	125,900	77	+28	7,079,000
–27	– 76	44.67	8	–41	2,512.00	43	– 6	141,300	78	+29	7,943,000
–26	– 75	50.12	9	–40	2,818.00	44	– 5	158,500	79	+30	8,913,000
									80	+31	10,000,000

For 50 ohms = –1.7 dBm = 224,000 μV = +47 dBmV
For 600 ohms = +9.0 dBm = 774,000 μV = +58 dBmV

Table 5-2. Recommended Test Equipment

EQUIPMENT	MANUFACTURER'S TYPE (OR EQUIVALENT)
Video Signal Generator	Tektronix 149A
Baseband Signal Generator	Hewlett Packard HP652A
RF Signal Generator	Hewlett Packard HP681C
Video Waveform Monitor	Tektronix 1485
Oscilloscope, Calibrated	Tektronix 465B
RMS Voltmeter	Hewlett Packard 3400A
Spectrum Analyzer	Hewlett Packard 141T
Path Loss Attenuator	As Required
Distortion Measurement System	
Audio Signal Generator	Sound Technology 1710A
Audio Distortion Analyzer	Sound Technology 1710A
EIA Weighting Network	Tektronix 015-0215-00
EIA Low Pass Filter	Tektronix 015-0215-00
EIA High/Low Pass Filter	Pomona 2390
75 Ohm Termination Resistor	Tektronix 011-0202-000
Digital Voltmeter	Fluke 8000A
Video Vectorscope	Tektronix 520A
Modulation Meter	Marconi TF2300B
Test Accessory Kit	MVS PN 807831-1
Test Transmitter	MA-2EP, MA-2CP, MA-2UX

RECEIVER PRETEST SETUP

Either of two basic adjustment and checkout configurations may be used. The preferred method consists of operating the Receiver on a test bench with a mating test Transmitter using path-loss test attenuators to control the received carrier signal level. This method is similar to that used in factory testing and should provide comparable results. The second method uses the actual operating path as the RF attenuator.

The test Transmitter shall be operating at the same frequency as the Receiver channel under test and adjusted for proper deviation (±4 MHz at 1V P-P). Unless otherwise specified, standard CCIR weighting, a receive carrier level of −40 dBm and 525 line TV emphasis shall be used.

Allow at least one hour of operation for the equipment to stabilize before conducting any adjustments or tests.

Test configurations employed are shown in Figure 5-1.

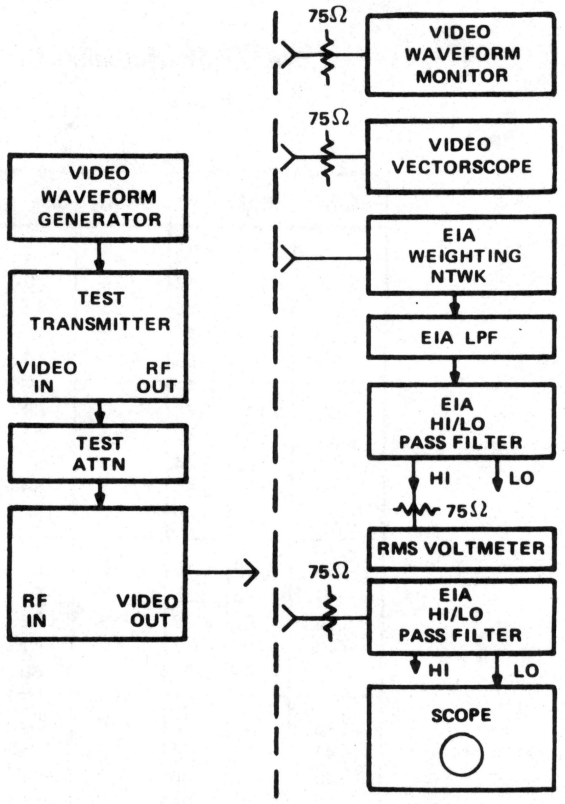


Figure 5-1. Receiver Test Configurations

PORTABLE RECEIVER ALIGNMENT

Module adjustment locations are shown in Figure 5-2.

CAUTION

Before applying power to the unit, check that all plug-in modules are properly seated.

Do not insert or remove modules while power is applied to the unit.

Step 1. Equipment Setup.

a. Connect the Transmitter RF output to a sufficient number of path-loss test attenuators to reduce the Transmitter RF power output level below 1 mW. Connect the Receiver RF input to the path-loss test attenuator output.

b. Remove top cover and place Receiver Demodulator module on extender card for access to internal adjustments. Use test accessories kit extender cables for signal connections to/from module except DO NOT connect coaxial jumper cable to Audio Subcarrier Demodulator module until audio alignment is to be performed.

Step 2. Meter Readings.

a. Turn ON test Transmitter and Receiver.

b. Check −22V and +5V meter readings and record in maintenance log.

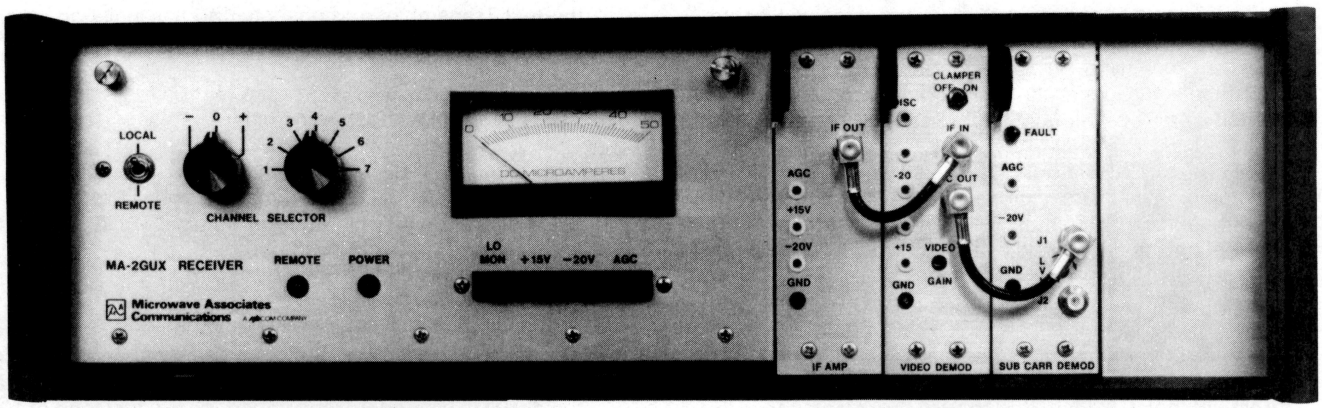


Figure 5-2. Module Adjustment Locations

c. Check LO and DISC readings on all operational RF channels and record in maintenance log.

Position CHANNEL SELECTOR to a mid-band channel for the following steps:

Step 3. Video Output Level Adjustment - Connect the video signal generator to the test Transmitter video input and apply a multiburst video signal at 1V P-P. Connect the waveform monitor to the VIDEO output jack on the Receiver unit. If necessary, adjust the VIDEO GAIN control on the face plate of the Receiver Demodulator module for 1V P-P (140 IRE units).

Step 4. De-Emphasis Adjustsment - Apply a window video signal at 1V P-P to the video input jack of the test Transmitter and observe 140 IRE units on a waveform monitor scope at the video output of the Receiver. Adjust the de-emphasis potentiometers R36 and R37 if necessary for a square window response.

Step 5. Frequency Response.

a. Connect the baseband signal generator to the Transmitter VIDEO jack.

b. Configure the baseband signal generator for 200 kHz at 1V P-P (140 IRE units).

c. Connect the terminated RMS voltmeter to the test Receiver output and record reading in the maintenance log.

NOTE

Calibrate the signal generator at each step prior to taking readings.

d. Holding the input signal level constant, take readings at 100, 200, and 500 kHz, and 1, 2, 3, 4, 4.5, 5.6, and 8 MHz. If required, adjust and variable capacitor C18 and potentiometer R55 on the Receiver Video Demodulator module for flat response. These adjustments are factory preset and normally should not require readjustment. Record difference in decibels between each reading and the reference reading.

Step 6. Receiver AGC Calibration - The purpose of this test is to calibrate the Receiver AGC meter reading and system signal-to-noise (S/N) ratio with a known RF signal input level. This information may be used for path loss testing and as an indication of received signal strength (Figure 5-3).

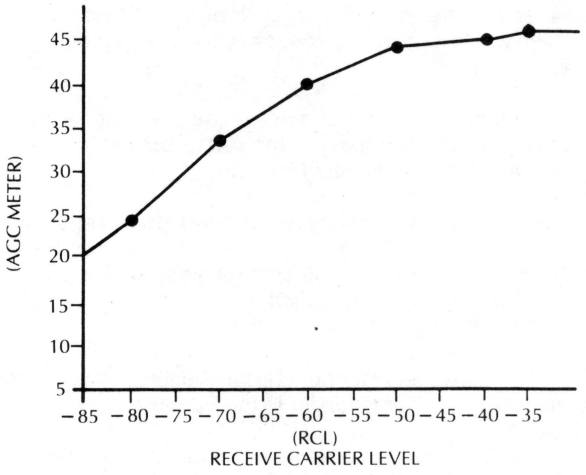


Figure 5-3. Typical Receiver Sensitivity

a. Connect the RF signal generator to the Receiver RF input connector with a calibrated coaxial cable.

b. Using a relatively strong signal (−30 dBm), adjust the signal generator to the operating frequency as indicated by a Receiver front test point DISC reading of zero.

c. Calculate the Receiver input power which is the mathematical sum of the interconnection cable loss plus the attenuator reading (i.e., −1 dB (cable loss) plus −30 dB attenuation setting, yields a Receiver input power of −40 dB).

d. Construct an AGC calibration chart (Table 5-3) of input versus AGC meter reading in 10 dB steps from −20 to −80 dBm and at 33 dB signal-to-noise (Receiver threshold) point. Record this chart in the maintenance log.

Restore the Receiver to normal path loss.

Table 5-3. AGC Calibration Chart

RF INPUT LEVEL	METER AGC READING	S/N RATIO
−20 dBm		dB
−30 dBm		
−40 dBm		
−50 dBm		
−60 dBm		
−70 dBm		
−80 dBm		
dBm		−33 dB

Step 7. Audio Alignment

NOTE

The Receivers are optionally available with one or two audio channels. Set up one audio channel at a time. Reference designations for both audio channels are given with those in parentheses applying to Subcarrier 2.

Verify that the test Transmitter is equipped with audio channels corresponding to the Audio Subcarrier Demodulator installed in the Receiver.

The test Transmitter shall be adjusted for proper subcarrier deviation (75 or 100 kHz per system requirements) and level (14 IRE units of subcarrier on the video for each audio channel).

a. Using extender card and cables, connect the Audio Subcarrier Demodulator to the Receiver.

b. Connect an audio distortion analyzer with appropriate load to the AUDIO 1 (2) output of the Receiver.

c. Apply multiburst at 1V P-P to video input jack of the test Transmitter and observe 140 IRE units on monitor connected to composite output of the Receiver.

d. Apply 1 kHz signal at required signal level to AUDIO 1 (2) of the test Transmitter.

e. Reference performance characteristics in Section 1. Check audio distortion, check frequency response (at −20 dB below normal input level) and check signal-to-noise (at normal input level).

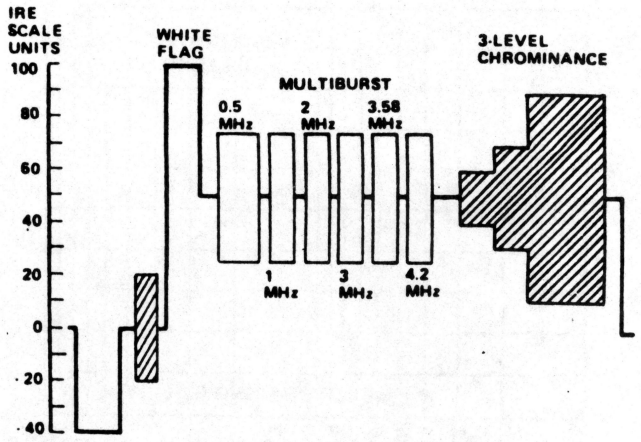
1) Method of Measurement - The audio channel shall be operated at standard input and output test tone (TT) level and the measuring equipment shall terminate the circuit in a standard load impedance. A test tone of 1000 Hz, having less than 0.1% rms harmonic distortion, shall be applied to the audio input of the system at 100% modulation at peak deviation.

2) Since pre-emphasis and de-emphasis are employed, the input level to the system shall be adjusted at each measurement to operate the system not to exceed peak deviation (75 or 100 kHz). This will require dropping the input audio level with increasing frequency as the pre-emphasis curve rises. The input and output level controls shall not be readjusted during this procedure.

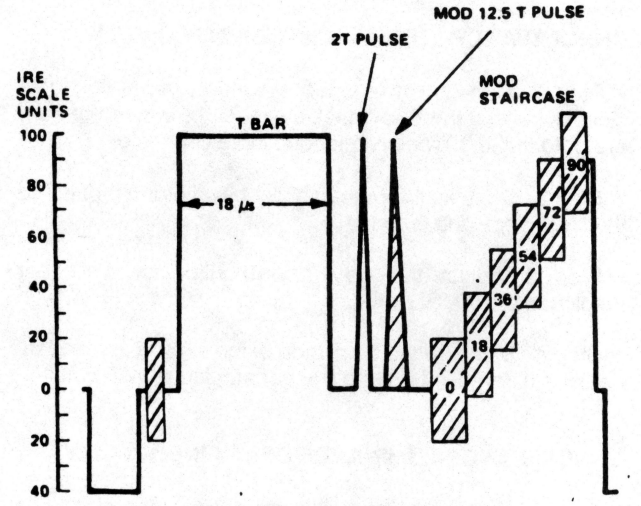
VIDEO SYSTEM PERFORMANCE TESTS

These tests are provided so that video system performance parameters can be properly met, and to insure compliance with operational requirements. Video waveforms are shown in Figure 5-4. The following tests should be performed.

- Video Unity Gain
- Video Frequency Response
- Video Differential Gain
- Video Differential Phase
- Video Signal-to-Noise
- Video Signal-to-Hum
- Chrominance-Luminance Gain Inequality
- Chrominance-Luminance Delay Inequality
- Field Squarewave Tilt
- 2T Pulse 'K' Factor



A. Composite Test Signal



B. Combination Test Signal

Figure 5-4. Video Test Waveforms

VIDEO UNITY GAIN. Prior to performing any other test, adjust the video system to unity gain at 1V P-P.

Step 1. Configure the video signal generator for multiburst operation into a terminated video waveform monitor.

Step 2. Adjust the video signal generator for proper output at 1V P-P and connect it to the Transmitter video input.

Step 3. Connect the path-loss test attenuators (70 dB below 10 GHz and 60 dB above 10 GHz) between the Transmitter RF output and the Receiver RF input.

Step 4. Connect the terminated video waveform monitor to the Receiver output. Adjust the Receiver video gain control on the Receiver Video Demodulator module for a 1V P-P signal.

This completes the video unity gain adjustment.

VIDEO FREQUENCY RESPONSE

Step 1. Connect the baseband signal generator to the Transmitter video input.

Step 2. Configure the baseband signal generator for 200 kHz at 1V P-P.

Step 3. Connect the terminated rms voltmeter to the Receiver output. Configure rms voltmeter for upper third scale reading and record reading in the maintenance log.

Step 4. Holding the input signal level constant, take readings at 10, 100, 500 kHz and 1, 2, 3, 3.58, 4.0, and 4.3 MHz. Record difference in decibels between each reading and the reference reading at 200 kHz.

Video Frequency Response (Alternate Method No. 1)

A terminated video waveform monitor with the horizontal sweep on two-thirds position, may be used in place of the rms voltmeter. Record frequency response as percent difference referred to 100% at 200 kHz reference and convert to decibels.

Video Frequency Response (Alternate Method No. 2)

A video sweep from 50 kHz to 5 MHz may be connected at 0.7V peak-to-peak to the Transmitter video input. View the recovered signal on a terminated video waveform monitor. Record frequency response as percent difference referred to 100% at 200 kHz reference and convert to dB.

VIDEO DIFFERENTIAL GAIN

Step 1. Configure the video signal generator for stairstep signal with 3.58 MHz subcarrier at 50% average picture level (APL). Connect the video signal generator to the Transmitter video input.

Step 2. Connect a terminated video vectorscope to the Receiver video output. Measure and record differential gain. Repeat for 10% and 90% APL.

Video Differential Gain (Alternate Method No. 1)

A terminated video waveform monitor, with the vertical input selector at high pass position, may be used to measure differential gain at 10, 50 and 90% APL.

VIDEO DIFFERENTIAL PHASE

Step 1. Configure the video signal generator for stairstep signal with 3.58 MHz subcarrier at 50% APL. Connect the signal generator to the Transmitter video input.

Step 2. Connect a terminated video vectorscope to the Receiver output. Measure and record differential phase. Repeat for 10 and 90% APL.

VIDEO SIGNAL-TO-NOISE (S/N)

Step 1. Connect EIA weighting network plus the Low Pass Filter and the High Pass Filter between the Receiver video output and a 75 ohm termination.

Step 2. Connect an rms voltmeter across the termination.

Step 3. Remove the Transmitter video input signal and terminate the Transmitter video input signal.

Step 4. Read the residual noise voltage on the rms voltmeter and convert this reading to signal-to-noise (S/N) in decibels by reference in Figure 5-5. Filter loss has been included in the chart preparation and, therefore, if 1V peak-to-peak unity gain exists in the system, the solid-line conversion is the system signal-to-noise (S/N) ratio. Record this value in decibels in the maintenance log.

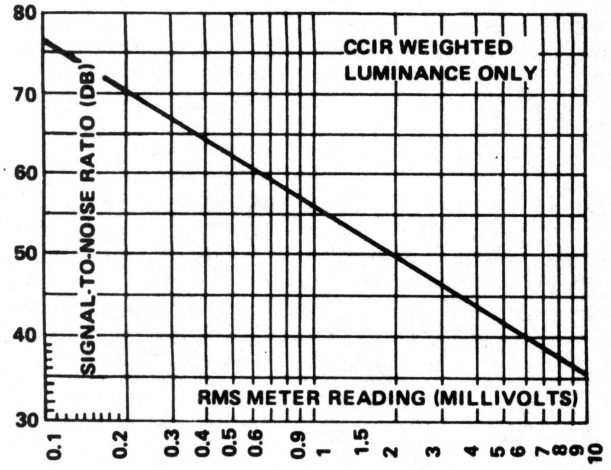


Figure 5-5. Signal-to-Noise (S/N) Conversion Chart

VIDEO SIGNAL-TO-HUM (S/H)

Step 1. Terminate the Receiver in 75 ohms.

Step 2. Connect EIA Low Pass Filter across the termination and connect the filter output to the oscilloscope.

Step 3. Remove the Transmitter video input signal and terminate the Transmitter video input terminal.

Step 4. Read the residual hum voltage on the oscilloscope in peak-to-peak amplitude and convert this reading in millivolts (mV) to signal-to-hum in decibels by reference to Figure 5-6. If 1V P-P unity gain exists in the system, the solid line conversion is the system signal-to-hum ratio. Record this value in decibels in the maintenance log.

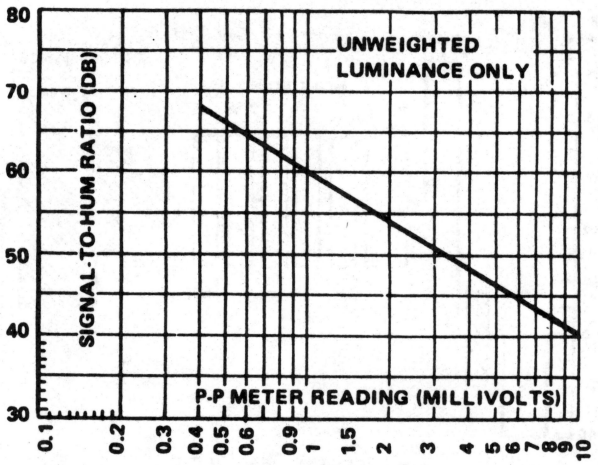


Figure 5-6. Signal-to-Hum (S/H) Conversion Chart

CHROMINANCE-LUMINANCE GAIN INEQUALITY

Step 1. Configure the video waveform generator for a sine^2 pulse and bar test signal. Connect the waveform generator to the test Transmitter video input connector.

Step 2. Connect a terminated video waveform monitor to the Receiver video output.

Step 3. Adjust the waveform monitor for a linebar amplitude of 100 IRE units.

Step 4. Measure the amplitude of the sine^2 pulse and record the difference from the line bar amplitude in IRE units.

CHROMINANCE-LUMINANCE DELAY INEQUALITY

Step 1. Configure the video waveform generator for a sine^2 pulse and bar test signal. Connect the waveform generator to the test Transmitter video input connector.

Step 2. Connect a terminated video waveform monitor to the Receiver video output.

Step 3. Adjust the waveform monitor for a sine^2 pulse amplitude of 100 IRE units.

Step 4. Expand the time scale and amplitude scale of the waveform monitor and observe the peak-to-peak envelope ripple at the base of the sine^2 pulse.

Step 5. Calculate the delay as follows:

Delay (ns) = 10D (for 12.5T modulated sine^2 pulse with half amplitude duration of 1.57 ms).

WHERE:
d is the peak-to-peak amplitude of baseline deviation in IRE units with gain errors normalized.

FIELD SQUAREWAVE TILT

Step 1. Configure the waveform generator for a field squarewave test signal. Connect the waveform generator to the test Transmitter video input.

Step 2. Connect a terminated video waveform monitor to the Receiver video output.

Step 3. Adjust the amplitude of the center of the bar for 100 IRE units on the waveform monitor display.

Step 4. Measure the peak-to-peak change in amplitude of the bar top in IRE units.

2T PULSE 'K' FACTOR

Step 1. Configure the video waveform generator for a window test signal. Connect the waveform generator to the test Transmitter video input.

Step 2. Connect a terminated video waveform monitor to the Receiver video output.

Step 3. Adjust the waveform monitor for a line bar amplitude of 100 IRE units.

Step 4. Measure the variation of the 2T pulse from the line bar in IRE units.

TROUBLESHOOTING PROCEDURES

Several modules in the Receiver are not field repairable. These are the LNA, Isolator, Bandpass Filter, Synthesizer, and Mixer. Detailed troubleshooting procedures for the IF/AGC Amplifier, Video Demodulator, and Audio Demodulator modules are provided at the end of this section. The Mixer Preamplifier may be repaired based on the information contained in the functional block diagram (Figure 2-1), the schematic, and the theory of operation contained in Section 2 of this manual.

ISOLATING DEFECTIVE MODULES. A simplified block diagram, Figure 5-7, contains signal flow and module gain/loss levels to enable the user to identify a defective module. It is necessary to use a calibrated spectrum analyzer when tracing RF and IF signals in order to avoid false readings caused by noise or image frequencies which would read as a received signal on a power meter. The following functional descriptions are intended to aid in isolating a defective module.

LNA. The LNA can be checked out by applying a 2 GHz test signal in the −60 to −30 dBm range. The gain is approximately 12 dB and the noise figure is approximately 3 dB. The LNA is susceptable to damage caused by static discharge – observe unprotected CMOS/GaAs precautions when making measurements or handling the LNA.

MIXER-PREAMPLIFIER. The response of the Mixer-Preamplifier should be flat (±0.25 dB) over a range of 70 ± 15 MHz. The gain of the Mixer-Preamplifier depends on the value of R14; for R14 equal to 180 ohms the gain should be 28 ± 1 dB; for R14 equal to 430 ohms the gain should be 33 ± 1 dB.

SYNTHESIZER PN 806413. The Synthesizer operates at a frequency

$$F_{syn} = F_o - 70$$

Where: F_{syn} = synthesizer output frequency in MHz
F_o = received frequency in MHz

Synthesizer output frequencies (Receiver operating frequencies) for the U.S. Broadcast Band are listed in Table 5-4.

Table 5-4. Synthesizer Output Frequencies

CHANNEL NO.	– OFFSET	0 OFFSET	+ OFFSET
1	1924.75	1929.00	1933.25
2	1942.25	1946.50	1950.75
3	1959.25	1963.50	1967.75
4	1976.25	1980.50	1984.75
5	1993.25	1997.50	2001.75
6	2010.25	2014.50	2018.75
7	2027.25	2031.50	2035.75

PADS. Pads should have a 75 ohm input and output impedence and an insertion loss as stated on the block diagram.

IF/AGC AMPLIFIER PN 809627. The IF/AGC Amplifier maintains a constant + 5 dBm 70 MHz output for a 70 MHz input dynamic range of − 55 to − 2 dBm. The maximum gain of the amplifier for signals not within the AGC range (i.e. − 55 dBm) is approximately 60 dB. The module draws approximately 310 ± 20 mA at −22.0 Vdc and less than 10 mA at + 5.0 Vdc.

VIDEO DEMODULATOR PN 809628. The Video/Demodulator must see a +5 dBm at 70 MHz input signal to function properly. There are three output signals; all are 1V P-P into 75 ohms: baseband video; composite (unfiltered video and subcarrier); and subcarrier(s) used as input to Single (Dual) Audio Demodulator module.) The module draws approximately 175 mA at −22 Vdc.

AUDIO DEMODULATOR PN 807548 (OPTIONAL). Although the input to the Audio Demodulator is 1V P-P, the subcarrier level necessary for proper operation of the Audio Demodulator is approximately −18 dBm or 20 dB below the video signal (100 mV or 14 IRE units). Table 5-5 lists subcarrier frequencies for the Audio Demodulators respectively. The module draws approximately 80 mA at −22 Vdc.

Table 5-5. Audio Demodulator Subcarrier Frequencies

PART #	SUBCARRIER FREQUENCY (MHz)
1	4.83 MHz
2	6.2 MHz
3	6.8 MHz
4	7.5 MHz
5	8.59 MHz

AUDIO DEMODULATOR PN 807926. Although the input to the Audio Demodulator is 1V P-P, the subcarrier level necessary for operation of the Audio Demodulator is approximately −18 dBm or 20 dB below the video signal (100 mV or 14 IRE units). The module draws approximately 100 mA at −22 Vdc.

MODULE TROUBLESHOOTING PROCEDURES

Troubleshooting procedures for the IF/AGC Amplifier, Demodulator/Video Amplifier, and the Single/Dual Audio Demodulator modules are listed in Tables 5-6 through 5-11.

The following alignment of the IF/AGC Amplifier module should be performed after any repairs or adjustments are performed.

Step 1. Connect the sweeper/generator to the IF input and output jacks using a splitter to feed both the direct reference input and attenuated test input on the analyzer.

Step 2. Connect a −18 Vdc MGC supply to terminal E4 and remove jumper plug W1.

Step 3. Set generator level to −55 dBm.

Step 4. Adjust C16 for the flattest response between 60 and 80 MHz.

Step 5. Increase generator level to −35 dBm.

Step 6. Adjust the MGC voltage for approximately 6 dB gain (IF INPUT to IF OUTPUT). The voltage should be approximately −10.0 Vdc.

Step 7. Disconnect the gain MGC supply from E4 and replace jumper W1.

Step 8. Connect the generator directly to the input (without splitter). Set the output level at −25 dBm at 70 MHz, cw mode.

Step 9. Connect the output of the IF/AGC Amplifier module to a power meter using a 75 to 50 ohm minimum loss pad.

Step 10. Adjust C25 for **minimum** output.

Step 11. Adjust R33 for −0.7 dBm as measured on the power meter.

Step 12. Vary the generator output from −55 dBm to −2 dBm and verify that the reading on the power meter remains constant at 0.7 ± 0.1 dBm.

Step 13. Set the generator output to −54 dBm and use the DVM to measure the voltage at terminal E2 (Meter AGC Volts). Set R55 for a reading of −3.00 ± 0.02 Vdc.

Step 14. Set the generator to −65 dBm and verify that the DVM reading is 0 Vdc.

Step 15. Set the generator to 0 dBm and verify that the DVM reading is approximately −20 ± 2 Vdc.

Table 5-6. Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	RECOMMENDED ACTION
No meter readings; POWER indicator extinguished.	a. No input voltage.	a. Check prime power source, power cable harness, and connectors.
	b. Blown fuse.	b. Replace rear panel fuse. If the new fuse blows when inserted, proceed to Step c.
	c. Defective Power Supply.	c. Check the Power Supply output according to specifications.
−20 or +15V meter reading incorrect.	a. Defective Power Supply circuit.	a. Check Power Supply outputs.
	b. Defective wiring.	b. Check power distribution wiring. See system interconnection wiring diagram in Section 7.
	c. Defective meter.	c. Check meter circuit. Measure the specified voltages at test points on the IF module.
LO MON meter reading incorrect.	a. Defective Mixer circuit.	a. Check out the Mixer-Preamplifier and replace as necessary.
	b. Defective LO.	b. Check the −20V input to LO and LO output power level. Measure the power at LO cable connection to Downconverter.
AGC meter incorrect.	a. No Receiver signal.	a. Check the RF power output of Mixer-Preamplifier. Also, check the antennas and transmission lines.
	b. Faulty cabling.	b. Check the IF interconnecting cables.
	c. Defective Downconverter circuit.	c. Check the IF Mixer-Preamplifier −20V input, as well as output frequency and level.
	d. Defective IF Amplifier module.	d. Check the following: 1. Verify meter reading by VOM checkout of AGC test point on IF Amplifier module front panel. 2. Check the +15V and −20V regulators, using a VOM on the respective IF Amplifier panel test points (Table 4-4).
	e. Defective AGC circuit.	e. Check the AGC wiring and meter switch.
	f. Transmitter off frequency.	f. Check associated Transmitter tuning and frequency.
	g. Local Oscillator off frequency.	g. Read the frequency with a frequency counter. Replace the LO if necessary.
Fault indication.	a. Insufficient subcarrier signal level.	Check the subcarrier signal at SC OUT on Video Demodulator (remove cable for test).
	b. Defective Video Demodulator.	1. Using front panel test points and a VOM, check the operation of −20V, +5V, +15V, regulators. 2. Check the DISC test point with a VOM and compare value with final test data sheet.
	c. Defective Subcarrier Demodulator.	1. Check −20V or +12V supply input (as applicable) with a VOM at the front panel test point. 2. Check the subcarrier signal at Subcarrier Demodulator panel AGC test point. 3. Check alarm relay contacts at TB1 on rear panel to verify the fault condition.

Table 5-7. IF/AGC Amplifier PN 809627 Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	RECOMMENDED ACTION
Little or no gain.	1. Incorrect bias on pin diode attenuators CR9 through CR17.	a. Measure voltage between terminal E8 and ground using 4 digit DVM. If reading is not − 12.00 @ 0.05 Vdc, adjust R38 for proper reading. b. If adjustment of R38 has no effect, check for − 20 Vdc at U6 pin 4 and − 6.4 Vdc at U6 pin 5. If voltage at U6 pin 4 is low look for shorted semiconductor on board. If only voltage at pin 5 is low, check resistance of R41 (825 ohms, 1%) and voltage across CR6. Replace CR6 if necessary. c. If R41 is within tolerance and CR6 is not defective, check for shorts and opens on etch tracks in vicinity of U6. Reheat possible cold solder joints. d. Replace U6 if necessary.
	2. RF amplifier chain or AGC circuitry.	a. Isolate feedback circuits by removing jumper plug W1 between terminals E2 and E3. Using externally applied "manual gain control" voltage applied to terminal E8 test RF Amplifier chain performance and anti-logarithmic amplifier/pin Bias Driver circuits. Procedure is as follows: Connect HP8601A Sweeper/Generator to IF INPUT jack and HP8407A Network Analyzer to IF OUTPUT jack, using the direct reference input and attenuated test input on the analyzer via a signal splitter. Set the generator to − 55 dBm output at 70 MHz. Remove jumper plug W1 and connect a "MGC" power supply set at − 18 Vdc to terminal E4. The input-to-output gain of the IF/AGC Amplifier module should be 60 dB for − 18 Vdc applied. Vary the "MGC" voltage. The gain of the module should vary as the "MGC" voltage is varied. b. Set the "MGC" voltage at − 12.05 Vdc. c. Measure V_{be} of Q3 junctions. If not 0.7V per junction, replace Q3. d. Measure the voltage at U4 pin 6. If approximately − 10.14 Vdc, then measure the voltage at U6A pin 1. If approximately − 4.24 Vdc, then measure V_{be} of Q6, Q7 and Q9. This should be approximately 0.7 Vdc for each of the transistors. Replace any defective semiconductor found, U9, U11, Q6, Q7 and Q9. e. Measure cases of U10 through U7 for + 5.0 Vdc. If reading is low or 0 Vdc or 15 Vdc then replace MWA 130 in question. f. Measure pin 2 of U10-U7. Reading should be + 5 Vdc. g. If measurements of both Steps e and f are OFF, check solder joints of chip capacitors (marked with * on schematic). Resolder if there appears to be a cold solder joint on any of the capacitors in question. Note: Chip capacitors **cannot** be soldered repeatedly. **Replace** the capacitor if it is reheated more than twice. h. Measure gain of U10-U7. Should be approximately 15 dB per amplifier. Replace amplifier if gain is out-of-tolerance. i. If gain is 2 or 3 dB low, measure the **forward** resistance of the pin diode attenuators CR9 through CR17 (all power OFF). If one or two diodes have significantly different resistance, replace it (e.g., CR9 through CR16 are 6K and CR17 is 6.7K, replace CR17). j. If signal is present at U7 pin 2 (verify with oscilloscope) and not at output jack J3, measure V_{be} of Q1 and Q2. Should be 0.7 Vdc. Measure V_{be} of Q1 and Q2. Should be − 16.77 Vdc and − 7.9 Vdc respectively.

Table 5-8. Video Demodulator PN 809628 Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	RECOMMENDED ACTION
Low output, no output.	1. Shorted semiconductor.	a. Measure voltage at E30 and E31. Should be + 15 and − 20 Vdc respectively. If not, check for shorted semiconductors. Repair or replace if necessary. b. Trace signal from input (J1) to output (J2, J3 or J4). Isolate defective circuit(s).
	2. R47 out of adjustment.	Using calibrated Transmitter as signal source and path-loss attenuators, apply 1V P-P video to Transmitter and adjust R55 for 140 IRE units output at J3. Alternately, use waveform generator setup for 1V P-P with 525 line pre-emphasis into ZFM-70 70 MHz Receiver at + 5 dBm output, adjust R55 for 140 IRE units.
	3. Discriminator out of adjustment.	Apply + 5 dBm signal at 70 MHz from link analyzer output to IF INPUT at J1. Connect composite output of waveform generator to BB INPUT of link analyzer. Adjust discriminator components C11, C12, and R16 for a linear response over ± 6 MHz. Adjust R55 to keep BB level on link below − 5 dBm. Set up with 525 line pre-emphasis between analyzer and ZFM-70. Turn S1 to OFF position. Adjust for frequency response within 0.25 dB to 8 MHz.
	4. Pre-emphasis out of adjustment.	Set up link analyzer with 525 line pre-emphasis as IF INPUT at + 5 dBm at 70 MHz. Turn S1 to OFF position. Adjust R36 and R37 for flattest response to 8 MHz.
Discriminator reading ON, meter OFF.	Discriminator calibration OFF.	Set voltage at discriminator test point E2 to 0 Vdc using R68.

Table 5-9. Audio Demodulator PN 807548 Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	RECOMMENDED ACTION
No output.	1. No subcarrier input to Audio Demodulator.	a. Check for sufficient subcarrier output at SC OUT of Video Demodulator. b. Trace signal "upstream" to isolate defective module. Check cables and input jacks.
	2. No power on board.	a. Check terminal E7 for + 15 Vdc in. b. Check TP7 for + 9V. If not present check Q8. c. Check for + 12V on front test panel. If not present, check U5. d. Replace Q8 and U5 if necessary.
	3. Wrong input filter (C4 through C12, L1 through L3).	Tune filter accordingly or use correct subcarrier frequency in Transmitter.
	4. Failed semiconductor.	Using oscilloscope, trace signal from input to output to isolate the failed component. Baseband video and subcarriers will be present at terminal E1. A clean, filtered subcarrier signal will be present at the base of Q3. Level should be 1.0 mV P-P, audio will be present at U1 pin 2 (with pre-emphasis), audio without pre-emphasis will be present at U3 pin 3 also TP4.
	5. Excessive distortion.	Apply 1 kHz TT test subcarrier signal at 75 kHz peak deviation to module SC INPUT. Set SC LEVEL to 100 mV P-P. Adjust L5 for minimum distortion as measured on distortion analyzer. Note that L5 is a fine adjustment. Adjust L4 if necessary. Both L4 and L5 should be in the center of their ranges (not all the way in or all the way out).
	6. Low output level.	Output should be set to + 9 dBm for 100 mV SC INPUT using 1 kHz TT and 75 kHz peak deviation. Adjust output level control as necessary. If necessary, adjust L4 for maximum output. Adjust L5 for minimum distortion.

Table 5-10. Audio Demodulator PN 807926 Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	RECOMMENDED ACTION
No output.	1. No subcarrier input to Audio Demodulator.	a. Check for sufficient subcarrier output at SC OUT of Video Demodulator. b. Trace signal "upstream" to isolate defective module. Check cable from IF/AGC Amplifier to Audio Demodulator PWB and subcarrier input jack.
	2. No power on board.	a. Check terminal E31 for − 20 Vdc. If not present, check Q19 for shorts. b. Check terminal E30 for − 15 Vdc. If low or 0 Vdc Q19 may be current limiting. Check board for shorts. Look for burnt out transistors. Make measurements with an ohmmeter across the − 15 Vdc buss, junctions of transistors, and across capacitors (especially electrolytics). c. If all semiconductors checkout good and there are no apparent shorts, replace Q19, Q20. d. If any shorts or shorted components have been removed or replaced, remeasure the output of Q19, Q20. It should be − 20 Vdc and − 15 Vdc respectively. If it is not, replace Q19 and Q20.
	3. Wrong input filter (C3 through C7; L1 through L5).	Use correct subcarrier frequency in Transmitter.
	4. Failed semiconductor.	Using oscilloscope, trace signal from input to output to isolate the failed component. Baseband video and subcarriers will be present at terminal E1. A clean, filtered subcarrier signal will be present at U1 pin 2. Level should be 1.0 mV P-P. Audio will be present at U1 pin 1 (with pre-emphasis), audio without pre-emphasis will be present at the emitter of Q14.
	5. Excessive distortion.	Apply 1 kHz TT test subcarrier signal at 75 kHz peak deviation to module SC INPUT. Set SC LEVEL to 100 mV P-P. Adjust L10 for minimum distortion as measured on distortion analyzer. Note that L10 is a fine adjustment. Adjust L9 if necessary. Both L9 and L10 should be in the center of their ranges (not all the way in or all the way out).
	6. Low output level.	Output should be set to + 9 dBm for 100 mV SC INPUT using 1 kHz TT and 75 kHz peak deviation. Adjust output level control as necessary. If necessary, adjust L9 for maximum output. Adjust L10 for minimum distortion.

SECTION 6
DIAGRAMS

Figure 6-1. MA-2GUX Receiver - Interconnection Wiring Diagram PN 840341 6-3

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Figure 6-19. Subcarrier Demodulator - Schematic Diagram PN 805220 (P/O 807926) 6-35

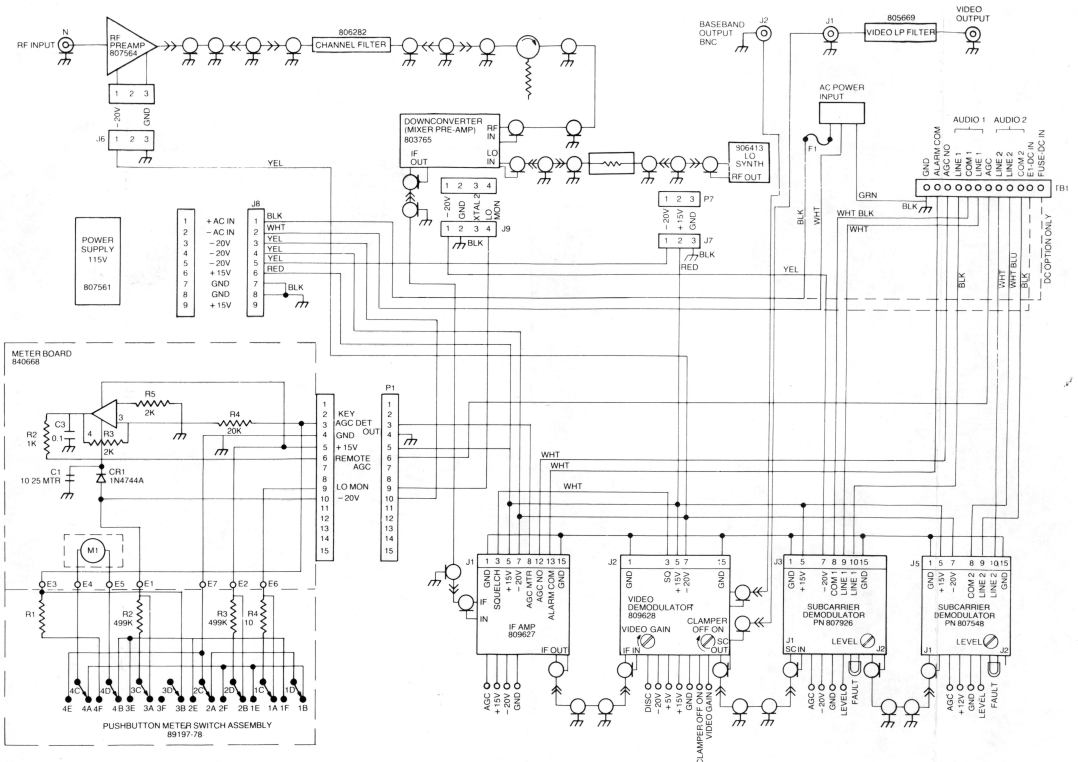
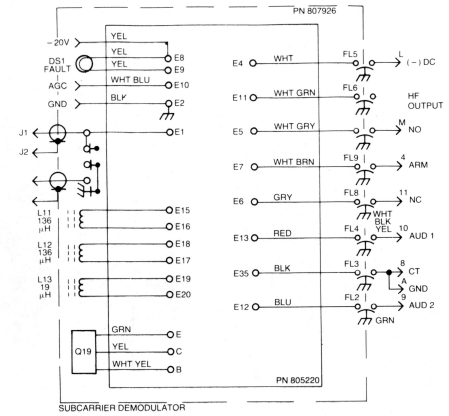
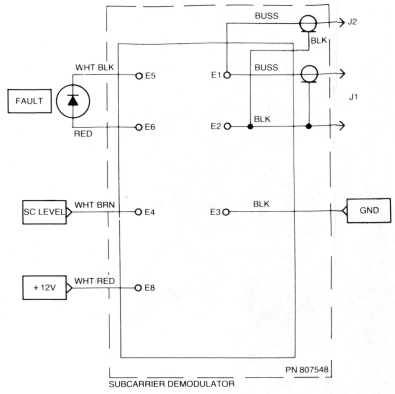
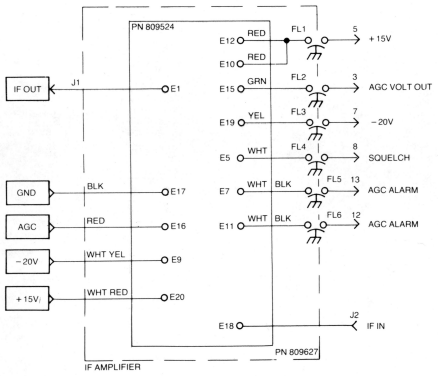


Figure 6-1. MA-2GUX Receiver – Interconnection Wiring Diagram PN 840341







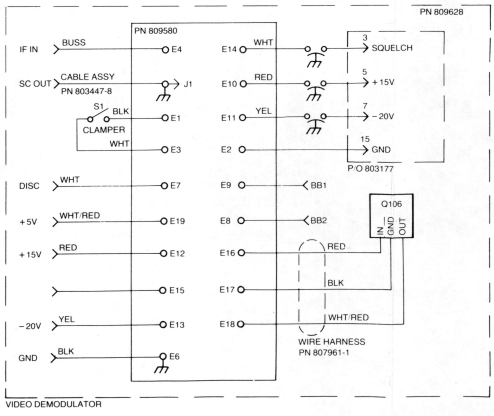


Figure 6-2. MA-2GUX Receiver – Plug-in Modules Wiring Diagram

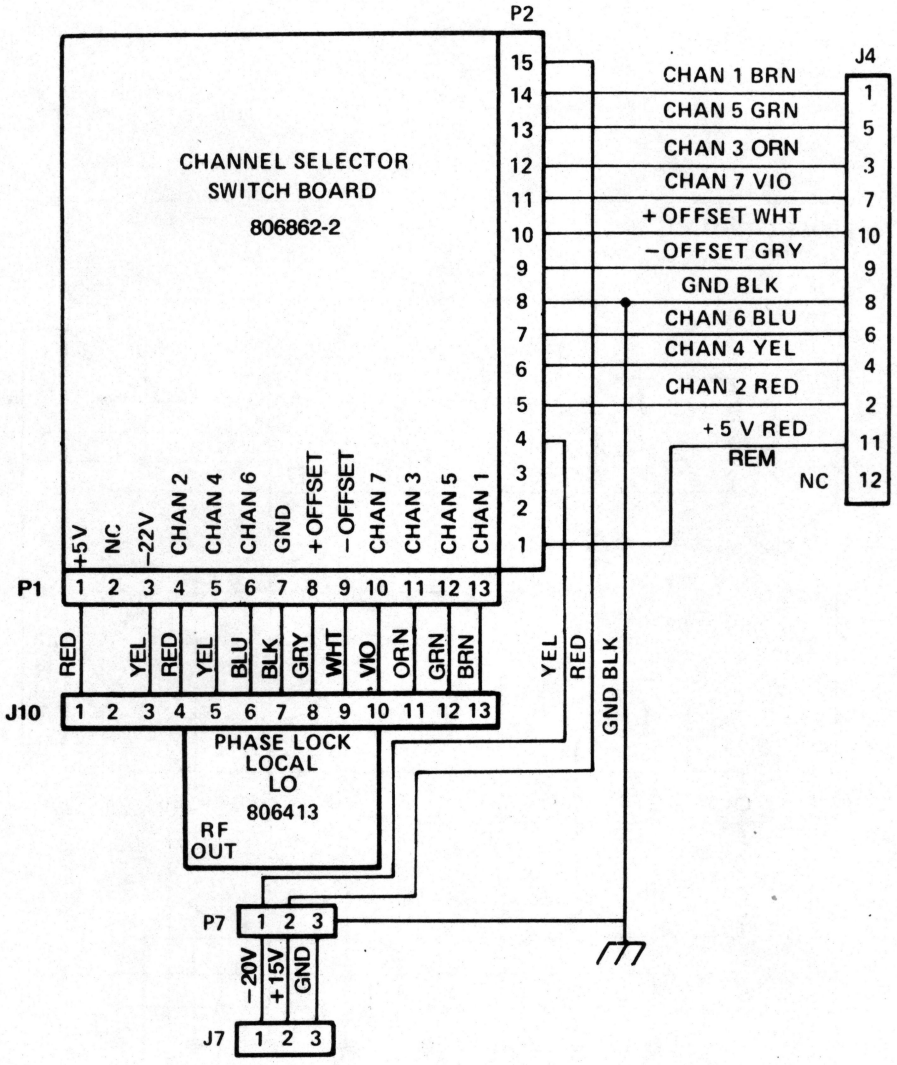


Figure 6-3. Meter Panel Assembly/Wiring Diagram PN 807676

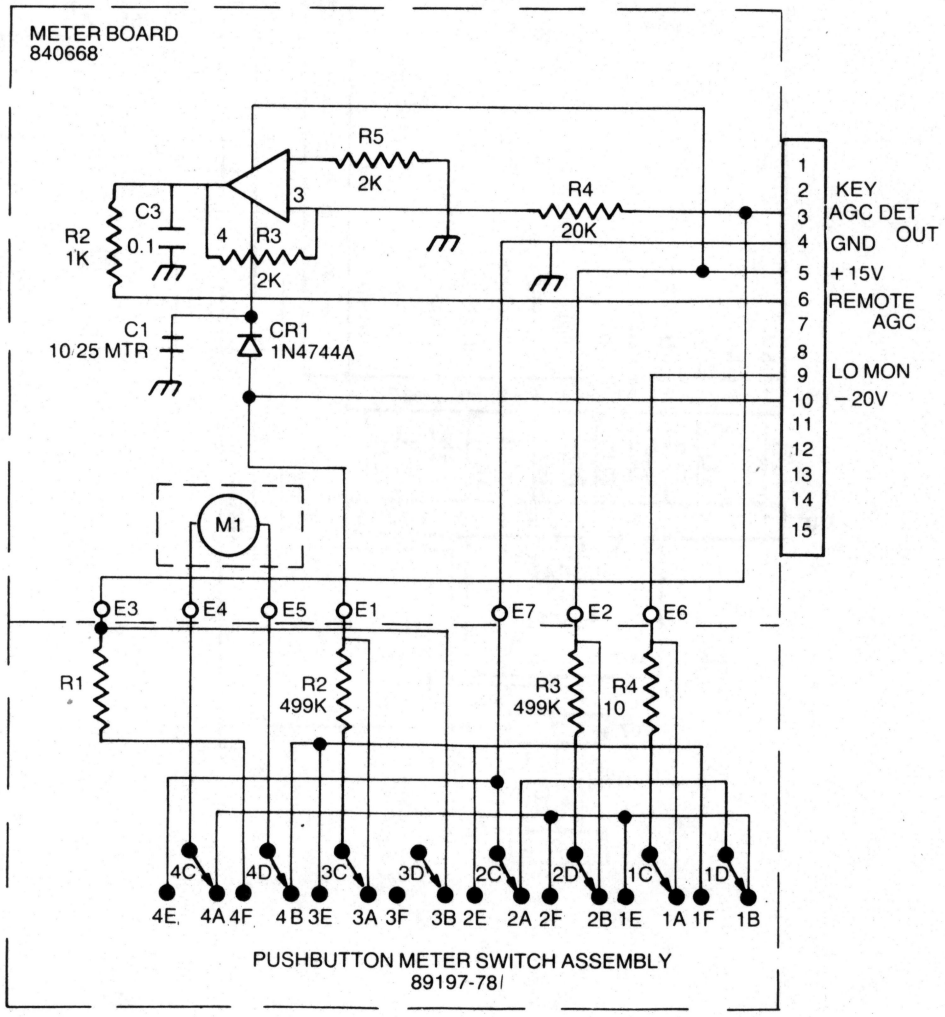


Figure 6-4. AGC Alarm/Meter Board Assembly PN 840668

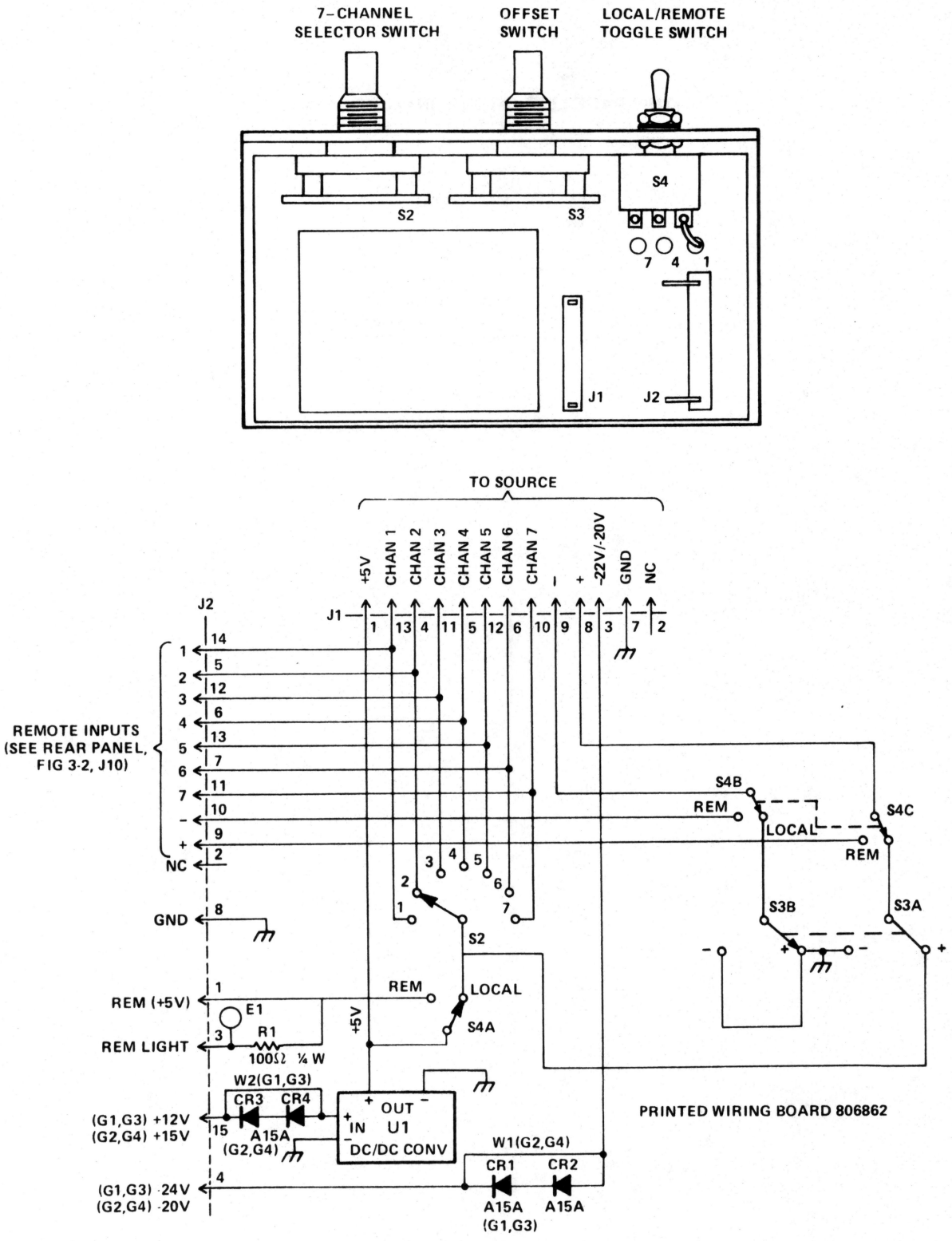
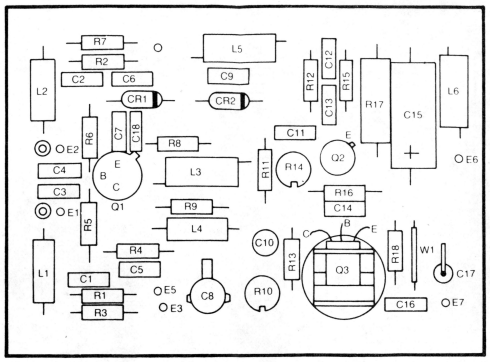


Figure 6-5. Synthesizer Control Assembly/Schematic PN 806862-2 (P/O 807688-1)



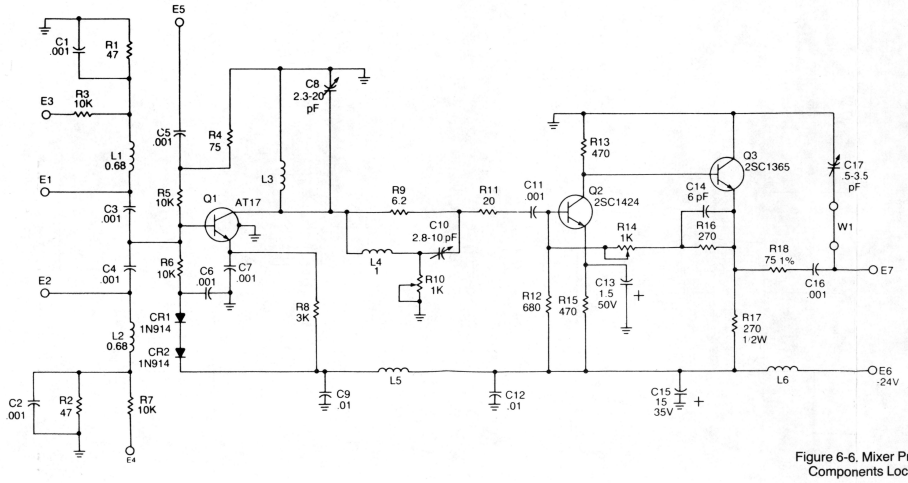
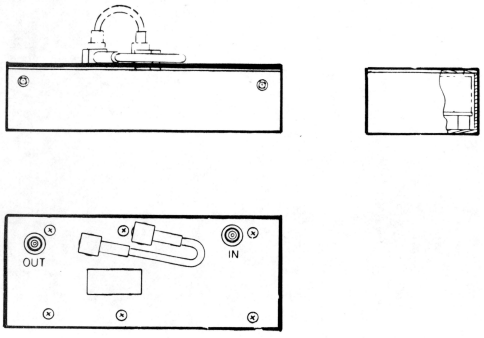
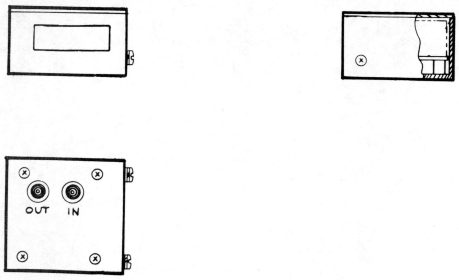


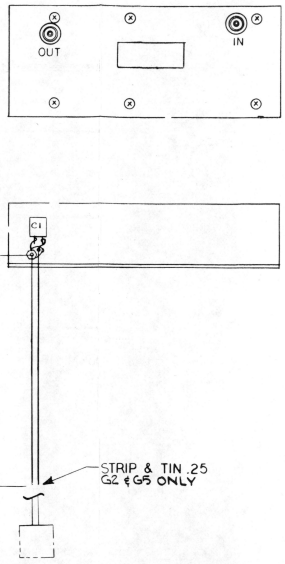
Figure 6-6. Mixer Pre-Amplifier Assembly PN 803130-1 (P/O 803765-1)
Components Locations/Schematic Diagram



A. 30 MHz Bandwidth IF Filter/Equalizer PN 807619-1

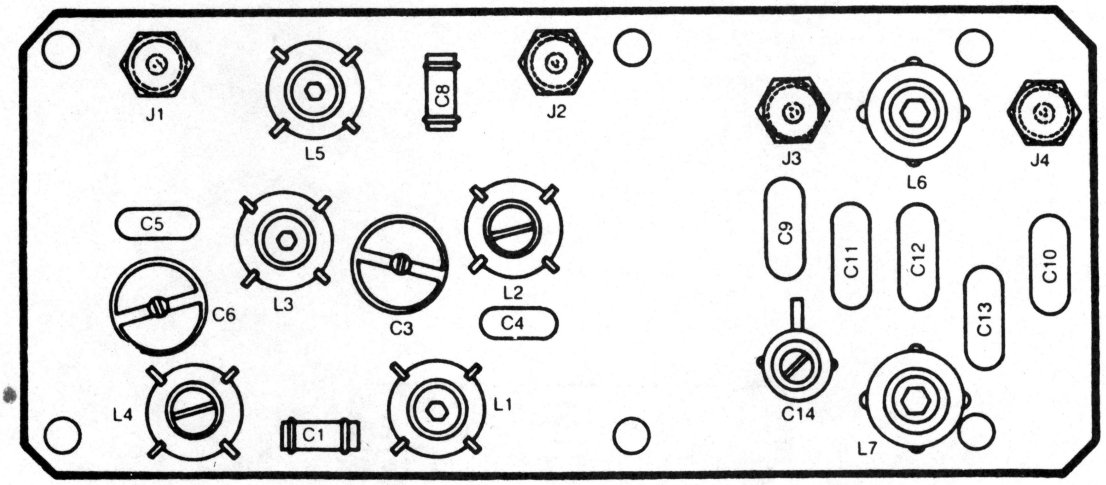


C. 12.5 MHz Bandwidth IF Filter/Equalizer PN 807619-2



B. 20 MHz Bandwidth IF Filter/Equalizer PN 807619-6

Figure 6-7. IF Filter/Equalizer Assembly PN 807619



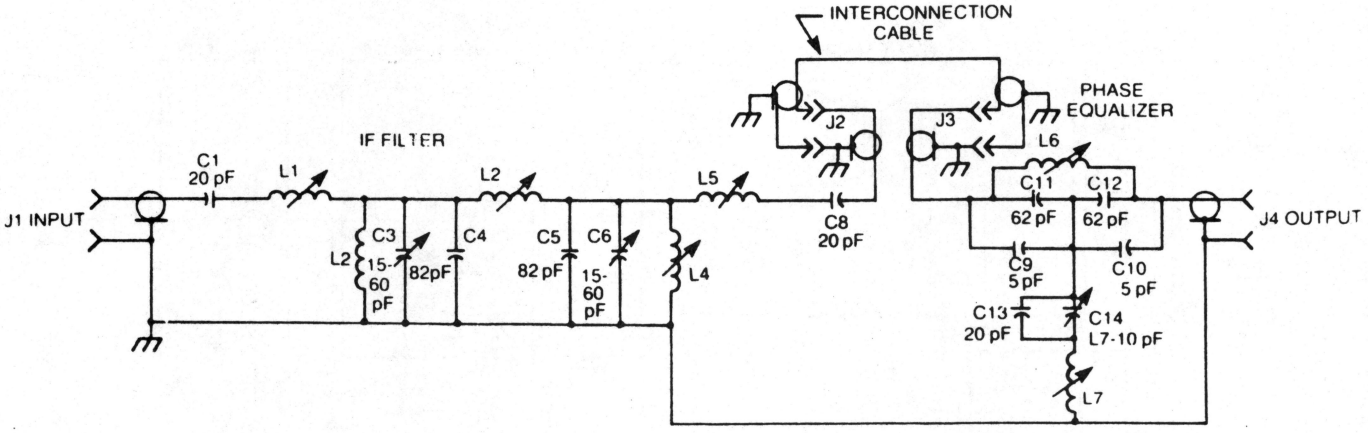


Figure 6-8. IF Filter/Equalizer – 30 MHz Bandwidth Component Locations/Schematic Diagram PN 802030-1 (P/O 807619-1)

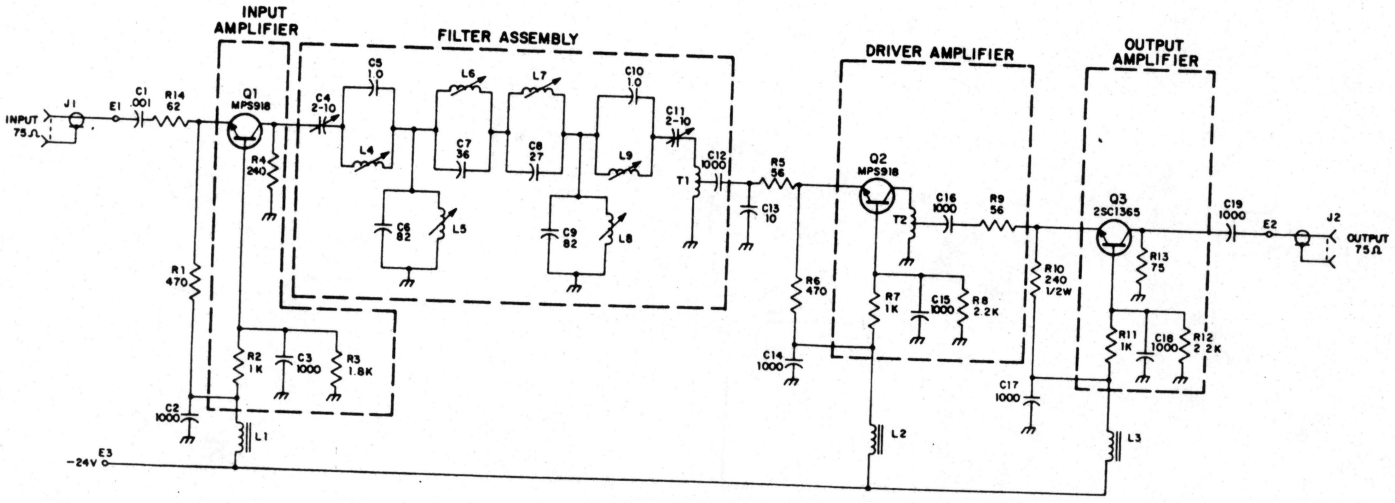
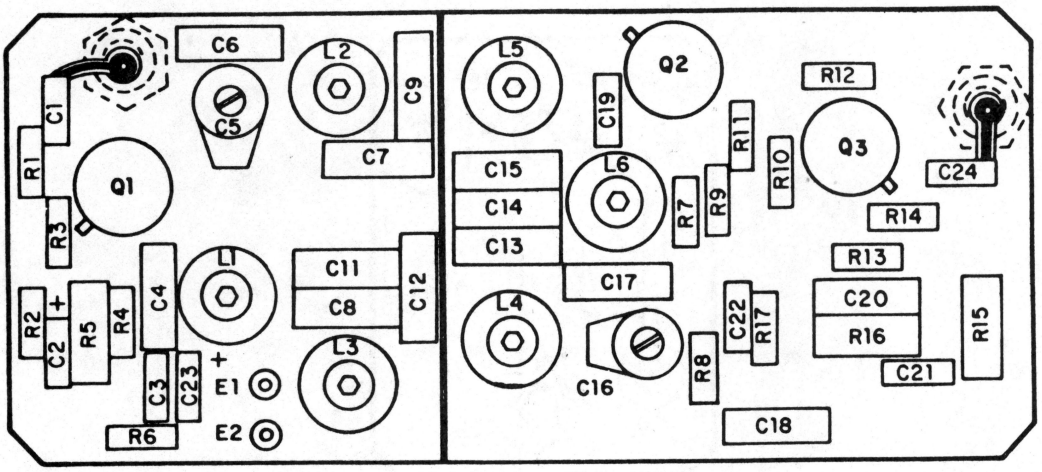


Figure 6-9. IF Filter/Equalizer – 20 MHz Bandwidth Component Locations/Schematic Diagram PN 805482-1 (P/O 807619-7)



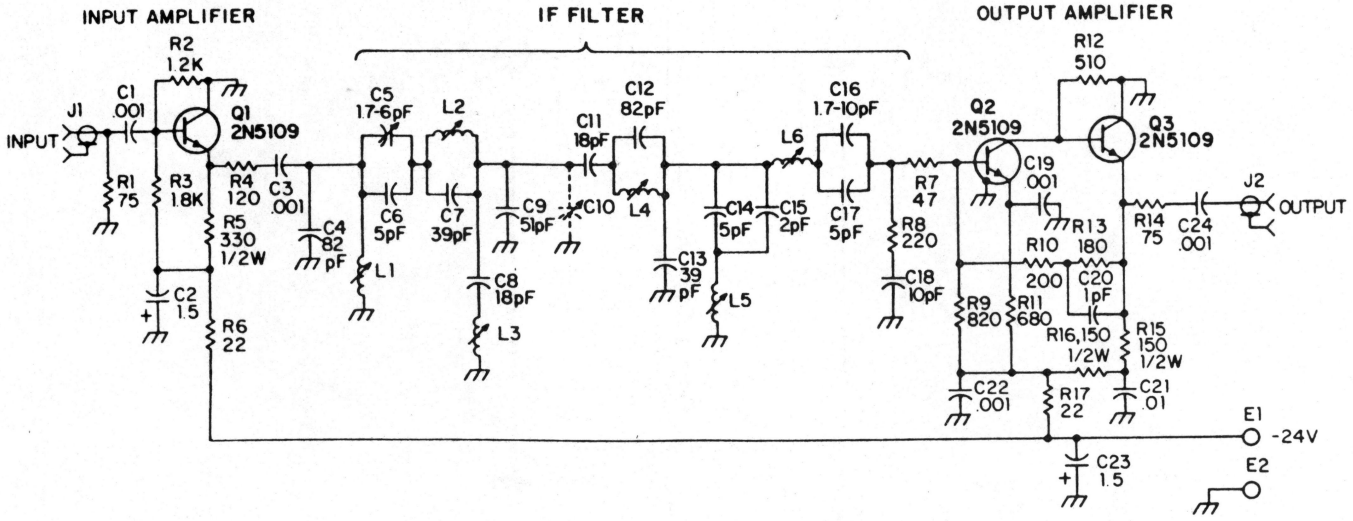


Figure 6-10. IF Filter/Equalizer – 12.5 MHz Bandwidth Component Locations/Schematic Diagram PN 806741-1 (P/O 807619-8)

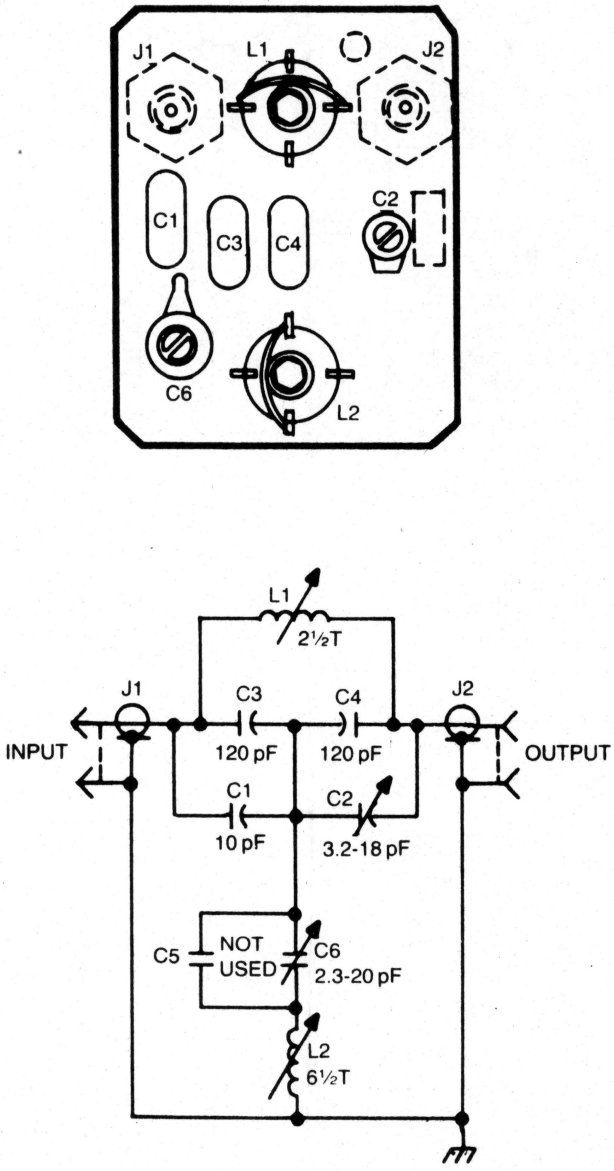


Figure 6-11. Phase Equalizer - Component Locations Schematic Diagram PN 807958 (P/O 807619)

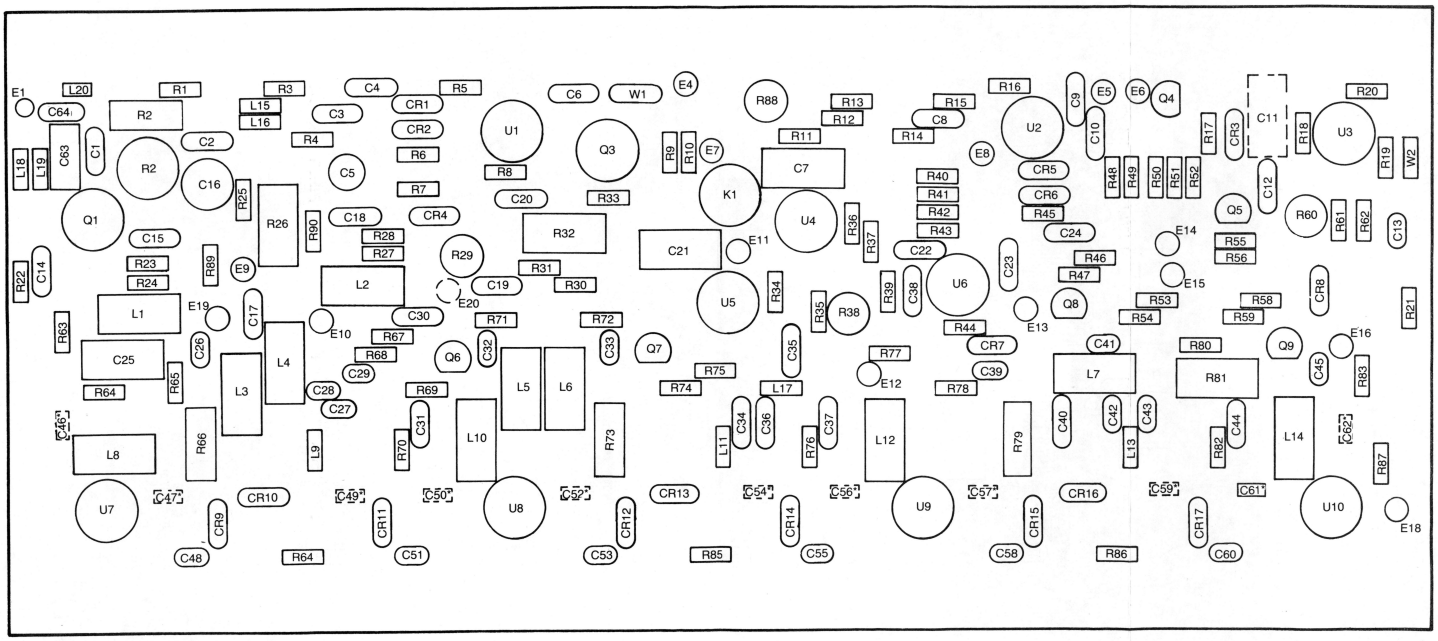


Figure 6-12. IF/AGC Amplifier - Component Locations PN 809524-1 (P/O 809627)

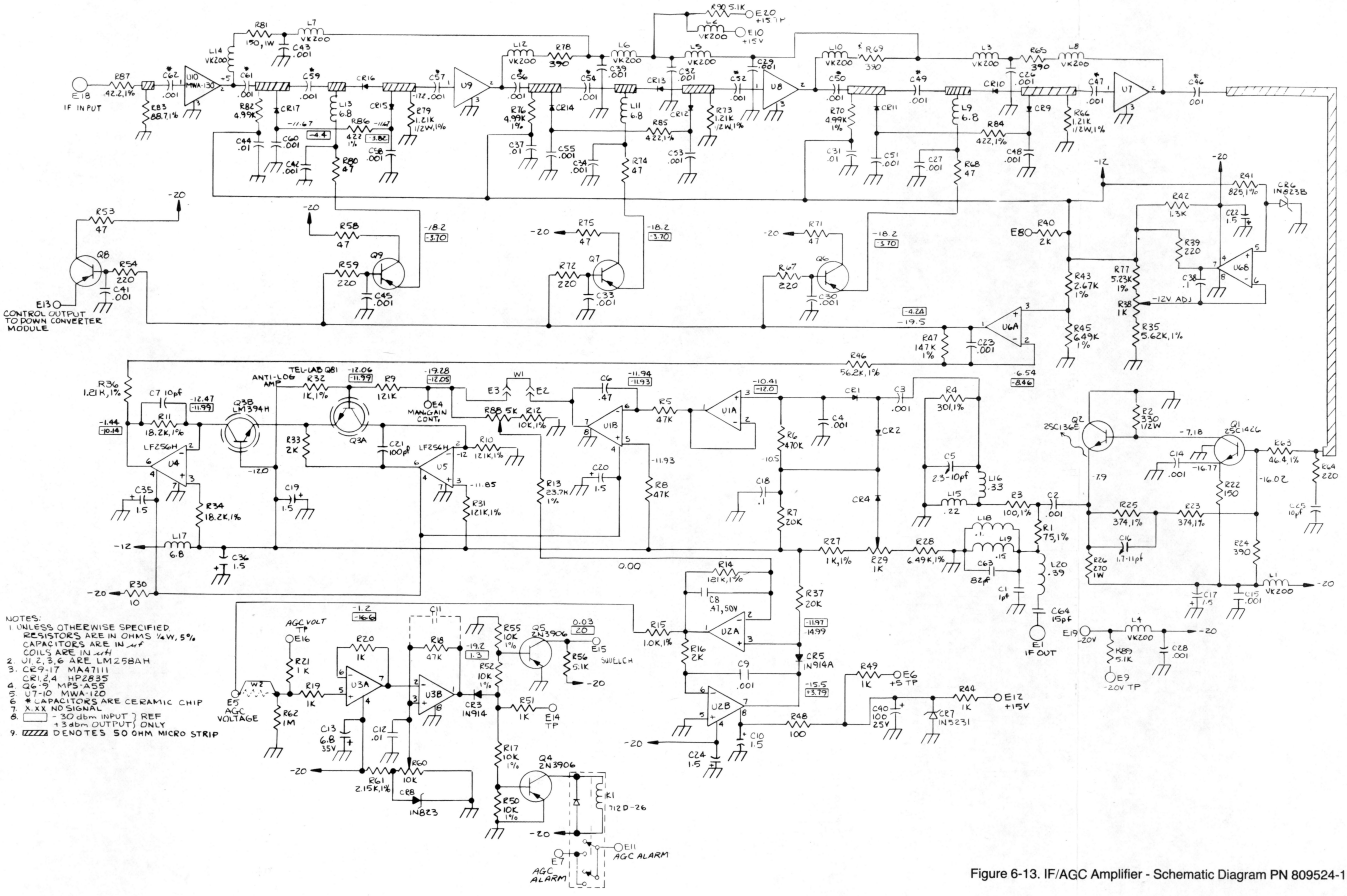


Figure 6-13. IF/AGC Amplifier - Schematic Diagram PN 809524-1 (P/O 809627)

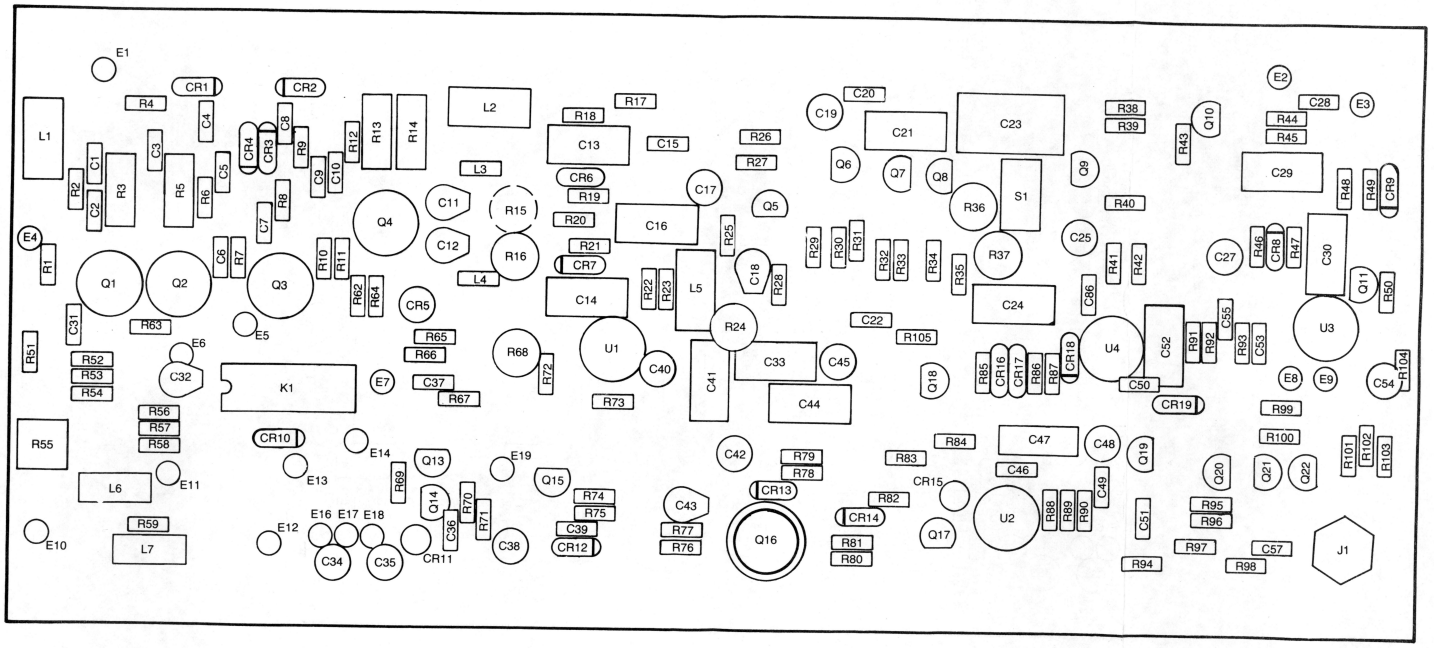


Figure 6-14. Video Demodualtor - Component Locations PN 809580 (P/O 809628)

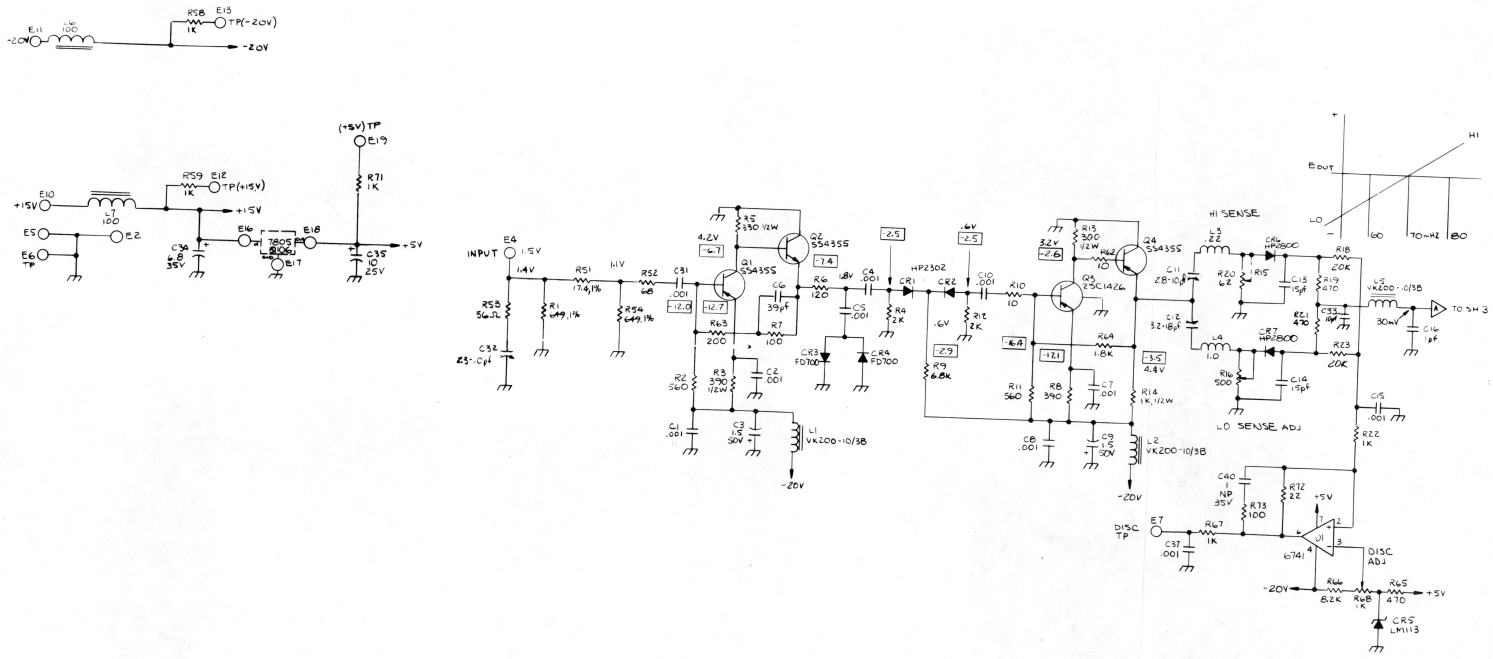


Figure 6-15. Video Demodulator - Schematic Diagram
PN 809580 (P/O 809628) (Sheet 1 of 2)

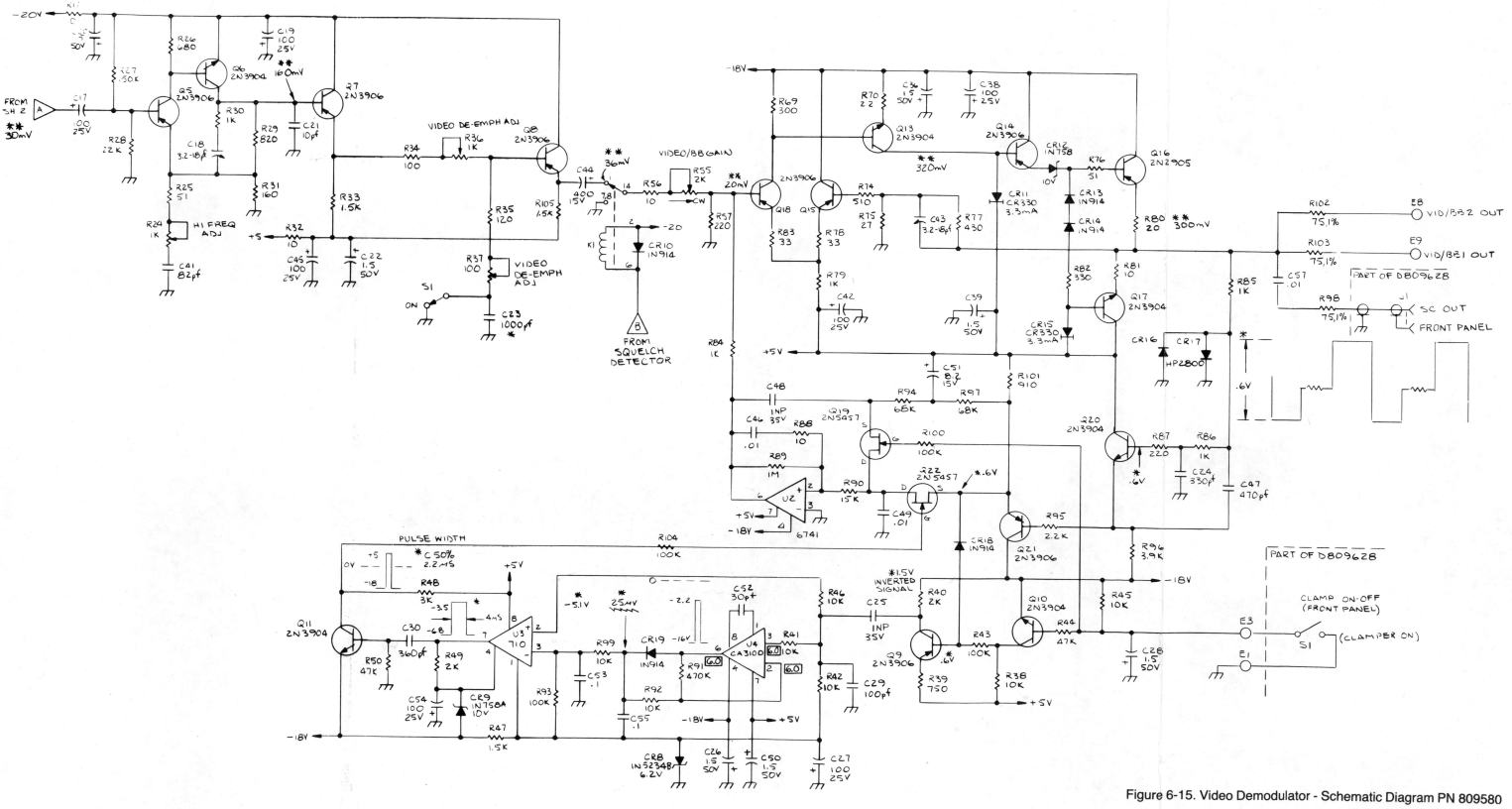


Figure 6-15. Video Demodulator - Schematic Diagram PN 809580 (P/O 809628) (Sheet 2 of 2)

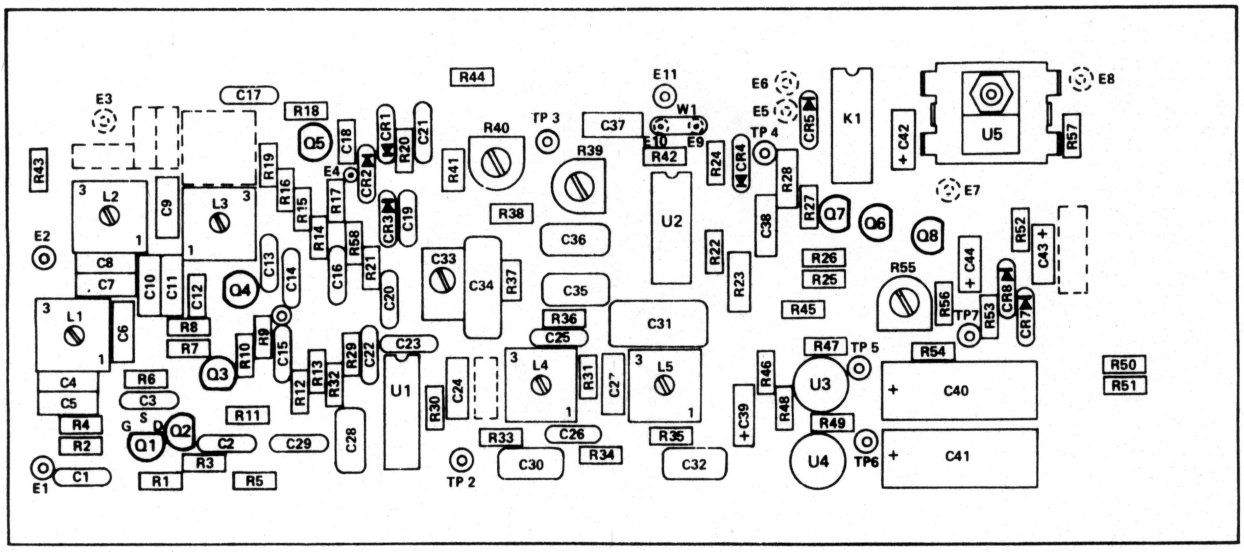
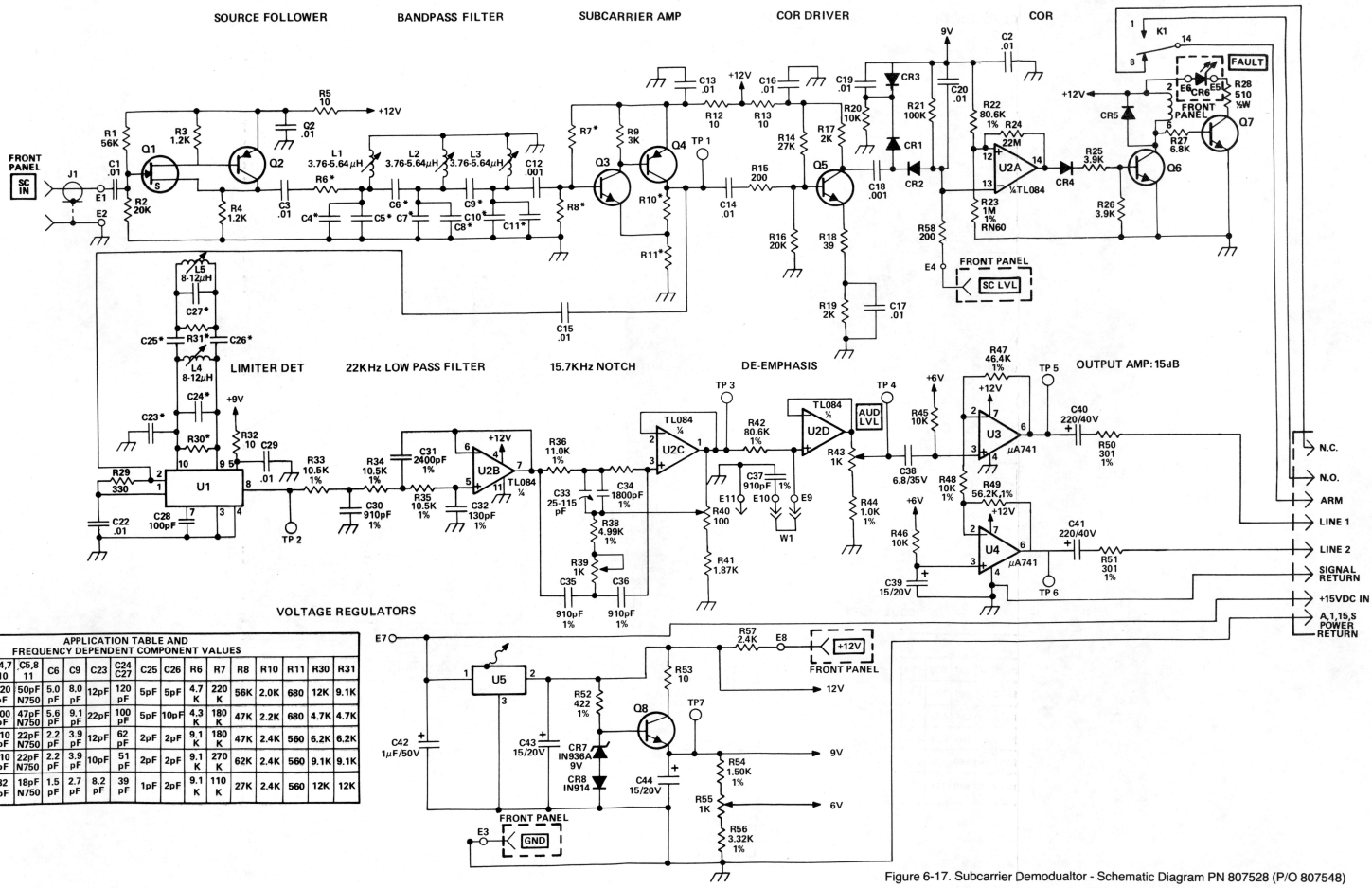


Figure 6-16. Subcarrier Demodualtor - Component Locations PN 807528 (P/O 807548)



APPLICATION TABLE AND FREQUENCY DEPENDENT COMPONENT VALUES														
GR	SUB CARR FREQ	C4,7 10	C5,8 11	C6	C9	C23	C24 C27	C25	C26	R6	R7	R8	R10	R11	R30	R31
1	4.5MHz	220 pF	50pF N750	5.0 pF	8.0 pF	12pF	120 pF	5pF	5pF	4.7 K	220 K	56K	2.0K	680	12K	9.1K
2	4.83MHz	200 pF	47pF N750	5.6 pF	9.1 pF	22pF	100 pF	5pF	10pF	4.3 K	180 K	47K	2.2K	680	4.7K	4.7K
3	6.2MHz	110 pF	22pF N750	2.2 pF	3.9 pF	12pF	62 pF	2pF	2pF	9.1 K	180 K	47K	2.4K	560	6.2K	6.2K
4	6.8MHz	110 pF	22pF N750	2.2 pF	3.9 pF	10pF	51 pF	2pF	2pF	9.1 K	270 K	62K	2.4K	560	9.1K	9.1K
5	7.4MHz 7.5MHz	82 pF	18pF N750	1.5 pF	2.7 pF	8.2 pF	39 pF	1pF	2pF	9.1 K	110 K	27K	2.4K	560	12K	12K

Figure 6-17. Subcarrier Demodualtor - Schematic Diagram PN 807528 (P/O 807548)

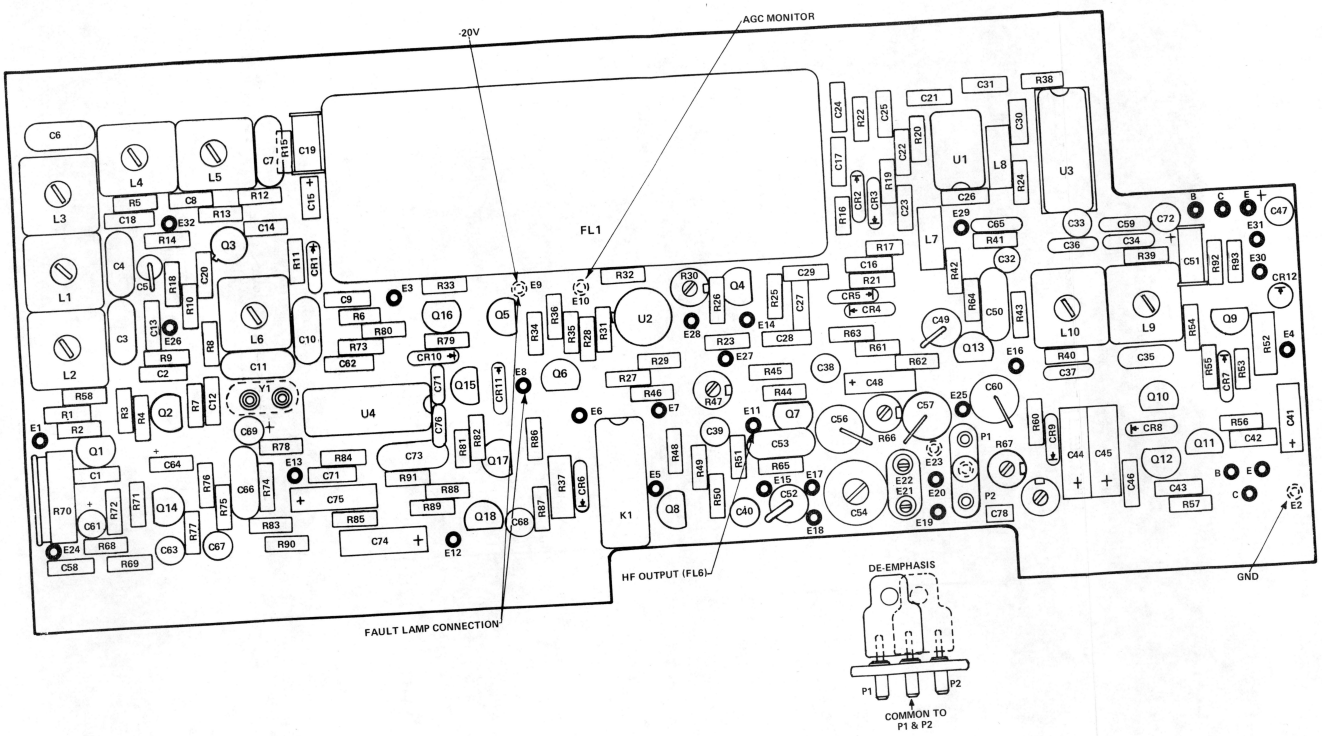


Figure 6-18. Subcarrier Demodulator - Component Locations PN 805220 (P/O 807926)

SECTION 7
PARTS LIST

1. Receiver Assembly PN 809993-4 7-2
2. Receiver Assembly PN 809993-5 7-3
3. Receiver Assembly PN 809993-6 7-4
4. Receiver Chassis Assembly PN 809994-2 7-5
5. AGC Alarm/Meter Board Assembly PN 840668-1 . 7-6
6. Wire Harness Assembly PN 840341-1 7-7
7. Wire Harness Assembly PN 807693-1 7-8
8. Downconverter Mixer Assembly PN 803765-7 7-9
9. IF Preamplifier Assembly (A2) PN 803130-2 7-10
10. 30 MHz BW IF Filter/Equalizer Assembly PN 807619-1 7-11
11. 30 MHz BW IF Filter/Equalizer Assembly PN 807619-3 7-12
12. 20 MHz BW IF Filter/Equalizer Assembly PN 807619-6 7-13
13. 20 MHz BW IF Filter/Equalizer Assembly PN 807619-7 7-14
14. 20 MHz BW IF Filter/Equalizer Assembly PN 807619-8 7-15
15. IF Filter Equalizer Assembly PN 802030-1 7-16
16. IF Filter PWB Assembly PN 806741-1 7-17
17. Phase Equalizer Assembly PN 807958-1 7-19
18. Phase Equalizer Assembly PN 807958-2 7-20
19. IF Filter PWB Assembly PN 805482 7-21
20. IF Amplifier Assembly PN 809627-1 7-23
21. IF AGC Amplifier PWB Assembly PN 809524-1 .. 7-24
22. Video Demodulator Assembly PN 809628-1 7-29
23. Video Demodulator PWB Assembly PN 809580-1 7-30
24. Subcarrier Demodulator PN 807926-1 7-35
25. Subcarrier Demodulator PN 807926-2 7-36
26. Subcarrier Demodulator PN 807926-3 7-37
27. Subcarrier Demodulator PN 807926-4 7-38
28. Subcarrier Demodulator PN 807926-5 7-39
29. Subcarrier Demodulator PN 807926-6 7-40
30. Subcarrier Demodulator PWB Assembly PN 805220 7-41
31. Subcarrier Demodulator Assembly PN 807548 ... 7-46
32. Subcarrier Demodulator Assembly PN 807528 ... 7-47

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
RECEIVER ASSEMBLY ASSEMBLY PN 809993-4			
	Chassis Assembly	809994-2	MVS
	Meter Panel Assembly	807676-5	MVS
	Subcarrier Demodulator Assembly	807926	MVS
	Subcarrier Demodulator Assembly	807548	MVS
	IF Filter Assembly	807619-8	MVS
	Demodulator Assembly	809628-1	MVS
	Phase Equalizer Assembly	807619-3	MVS
	IF Amplifier Assembly	809627-1	MVS
	Video Low Pass Filter	805669-99	MVS
	Synthesizer Frequency Source	806413-2	MVS
	Top Cover Chassis	807304-1	MVS
	Low Pass Filter Bracket	807706-1	MVS
	Cable Assembly IF OUT	806859-10	MVS
	Cable Assembly	801832-8½	MVS
	Cable Assembly	805172-10	MVS
	Cable Assembly	804235-4	MVS
	Cable Assembly	801832-2.5	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
RECEIVER ASSEMBLY ASSEMBLY PN 809993-5			
	Chassis Assembly	809994-2	MVS
	Meter Panel Assembly	807676-5	MVS
	Subcarrier Demodulator Assembly	807926	MVS
	Subcarrier Demodulator Assembly	807548	MVS
	IF Filter Assembly	807619-7	MVS
	Demodulator Assembly	809628-1	MVS
	Phase Equalizer Assembly	807619-6	MVS
	IF Amplifier Assembly	809627-1	MVS
	Video Low Pass Filter	805669-99	MVS
	Synthesizer Frequency Source	806413-2	MVS
	Top Cover Chassis	807304-1	MVS
	Low Pass Filter Bracket	807706-1	MVS
	Cable Assembly IF OUT	806859-10	MVS
	Cable Assembly	801832-8½	MVS
	Cable Assembly	805172-10	MVS
	Cable Assembly	804235-4	MVS
	Cable Assembly	801832-2.5	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
RECEIVER ASSEMBLY ASSEMBLY PN 809993-6			
	Chassis Assembly	809994-2	MVS
	Meter Panel Assembly	807676-5	MVS
	Subcarrier Demodulator Assembly	807926	MVS
	Subcarrier Demodulator Assembly	807548	MVS
	IF Filter Assembly	807619-1	MVS
	Demodulator Assembly	809628-1	MVS
	IF Amplifier Assembly	809627-1	MVS
	Video Low Pass Filter	805669-99	MVS
	Synthesizer Frequency Source	806413-2	MVS
	Top Cover Chassis	807304-1	MVS
	Low Pass Filter Bracket	807706-1	MVS
	Cable Assembly IF OUT	806859-10	MVS
	Cable Assembly	801832-8½	MVS
	Cable Assembly	805172-10	MVS
	Cable Assembly	804235-4	MVS
	Cable Assembly	801832-2.5	MVS

RECEIVER CHASSIS ASSEMBLY PN 809994-2

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	Base Plate	806673-1	MVS
	RH Side Panel Chassis	807307-1	MVS
	LH Side Panel Chassis	807306-1	MVS
	Center Panel Chassis	804153-2	MVS
	Center Panel Rear Support	804152-2	MVS
	Card Guide Extrusion	804167-4	MVS
	Connector Mounting Rail Extrusion	806759-1	MVS
	Wire Harness Assembly	840341-1	MVS
	Lower Cardguide	806760-1	MVS
	Upper Cardguide	806760-2	MVS
	Top Bezel Extrusion	806675-1	MVS
	Bottom Bezel Extrusion	806676-1	MVS
	Side Bezel	803869-2	MVS
	Front Panel Hinge	806672-1	MVS
	Front Panel Bracket	806670-1	MVS
	Back Panel	809995-1	MVS
	Side Plate	803337-3	MVS
	Side Plate	803337-4	MVS
	Connector Bracket, Disconnect	804170-2	OMQ
	Connector Strip	802496-10	MVS
	Connector, 30 Pin	89350-17	
	Terminal Block, 12 Position	89892-15	Beau 7192-C or 72912-C
	Fuse Holder	89300-4	
	Connector Mounting Bracket	807686-1	MVS
	Wire Harness Assembly	807693-1	MVS
	Cable Assembly (BB OUT-VID OUT)	804999-8	MVS
	Connector, 90° SMA Adapter	89396-12	MVS
	Ground Lug	88228	Zierick 503
	Fuse, 3A AGC	88200-3	
	Demodulator Assembly	809628-1	MVS
	IF Amplifier Assemlby	809627-1	MVS
	Mixer Assembly	803765-7	MVS
	Preamplifier	807564-1	MVS
	2 GHz Bandpass Filter Tuning Kit	806282-3	MVS
	Isolator	802877-6	MVS
	Cable Assembly (TNC-SMA)	803640-10	MVS
	Wire Harness Assembly	809997-1	MVS
	Wire Harness Assembly (LNA)	806865-14	MVS
	Cable Assembly (IF OUT)	806859-10	MVS
	Cable Assembly (RF IN)	806806-1	MVS
	Cable Assembly (Front Panel)	801832-2½	MVS
	Power Supply, 115 Vac	807561-1	MVS
	Power Cord, 115 Vac	88235	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
AGC ALARM/METER BOARD ASSEMBLY PN 840668-1			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1,C2	10, 25V	89719-9	Marcon
C3	0.1	88212-14	
	DIODES		
CR1	1N4744A	89439-4	
	TERMINALS		
E1,E2,E3,E4,E5,E6 E7,E8,E9,E10,E11	Terminal	89383	CTC 3653-2
	CONNECTORS		
J1	Wafer Right Angle	89351-45	Molex 15P
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R1	3.9K, 1/2W, 5%	88037	RC20GF392J
R2	1K	89220	RC07GF101J
R3	2K	89488	RC07GF201J
R4	20K	89200-14	RC07GF203J
R5	2K	89488	RC07GF201J
	INTEGRATED CIRCUITS		
U1	mA710HC	89889-3	Fairchild

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
WIRE HARNESS ASSEMBLY PN 840341-1			
J6,J7	Connector, 3 Pin	88358-84	Molex
J8	Connector, 9 Pin	89350-92	Molex
J9	Connector, 4 Pin	89350-58	Molex
P1	Connector, 15 Pin	89351-15	Molex 22-01-2151
	Connector, Female	89396-20	Molex 02-06-1101
	Pin, Male	89351-1	KK-100 Series 08-50-0113
	Polarizing Key	89351-2	Molex 15-04-9209
	Ground Lug	88226	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
WIRE HARNESS ASSEMBLY PN 807693-1			
J4	Connector, 12 Pin Receptacle	89350-67	Molex 1360-12-03-09-1125
J10	Connector, 12 Pin, Receptacle	89350-50	Molex 1625-12-03-06-1121
P1	Connector, 13 Pin Receptacle	89351-13	Molex 22-01-2131
P2	Connector, 15 Pin Receptacle	89351-15	Molex 22-01-2151
P7	Connector, 3 Pin Plug		Molex 1625-3-03-06-2031
	Pin, KK100 Series	89351-1	Molex 08-50-0113
	Pin, Male	89396-24	Molex 02-06-2103
	Pin, Female	89396-20	Molex 02-06-1103
	Pin, Female	89350-21	
	Key, Polarizing	89351-2	Molex 15-04-9209

DOWNCONVERTER MIXER ASSEMBLY PN 803765-7

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	Preamplifier PWB Assembly	803130-2	MVS
	Cable Assembly	806814-1	MVS
	Cable Assembly	804033-1	MVS
	Microstrip Board	803766-1	MVS
	Bottom Cover	804126-1	MVS
	Top Cover	803166	MVS
	Connector, Snap-On	88358-20	Sealectro 51-145-0000
	Connector, SMA Female	803195-1	MVS
	Filter Feedthru	89971	Erie
	Solder Lug	88520-3	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
IF PREAMPLIFIER ASSEMBLY (A2) PN 803130-2			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1,C2,C3,C4,C5,C6	0.001, 200V	87210	Vitramon CK05BX102K
C7	1000 pF	89007-14	Erie 8121-100
C8	Variable, 4-40 pF	89017-34	Matsushita
C9	0.01, 200V	87211	Vitramon CK06BX103K
C10	Variable, 2.8-10 pF	89017-28	Matsushita
C11	0.001, 200V	87210	Vitramon CK05BX102K
C12	0.01, 200V	87211	Vitramon CK06BX106K
C15	15, 35V	89056	CS13AF150K
C16	0.001, 200V	87210	Vitramon CK05BX102K
C17	Variable, 0.5-3.5 pF	89100-8	Johanson 8051
C18	1000 pF	89007-14	Erie 8121-100
	DIODES		
CR1,CR2	1N914A	89405	Motorola
	COILS		
All coils are in microhenries unless otherwise specified.			
L1,L2	1	87255	Delevan 1537-12
L3	Ferrite	89169-37	Ferroxcube VK200-10/3B
L4	1	87255	Delevan 1537-12
L5,L6	Ferrite	89169-37	Ferroxcube VK200-10/3B
	TRANSISTORS		
Q1	K6002 or V875	87223-44	KMC or NEC
Q2	2SC1424	87223-41	NEC
Q3	2SC1365	87223-37	NEC
	RESISTORS		
All resistors are in ohms 1/4W 5% unless otherwise specified.			
R1,R2	47	89201	RC07GF470J
R3	2K	89488	RC07GF202J
R4	75	89280	RC07GF750J
R5,R6	10K	89227	RC07GF103J
R7	2K	89488	RC07GF202J
R8	3K	89490	RC07GF302J
R9	27	89200	RC07GF270J
R10	Potentiometer, 1K	88453-26	Beckman 62P
R11	5.1	89238-45	RC07GF512J
R12	680	89206	RC07GF681J
R13	470	89234	RC07GF471J
R14	Potentiometer, 1K	88453-26	Beckman 62P
R15	470	89234	RC07GF471J
R16	270	89485	RC07GF271J
R17	270, 1W, 5%	88055	RC32GF271J
R18	75, 1/8W, 1%	87456	RN55D75R0F

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
30 MHz BW IF FILTER/EQUALIZER ASSEMBLY PN 807619-1			
	Housing	807853-1	MVS
	Cover	807854-1	MAC
	30 MHz IF Filter/Equalizer Assembly	802030-1	MVS
	Coaxial Cable Assembly	801832-2.5	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
30 MHz BW IF FILTER/EQUALIZER ASSEMBLY PN 807619-3			
	Housing	807957-1	MVS
	Cover	807854-2	MAC
	Phase Equalizer PWB Assembly	807958-1	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
20 MHz BW IF EQUALIZER ASSEMBLY PN 807619-6			
	Housing	807957-1	MVS
	Cover	807854-2	MVS
	20 MHz Phase Equalizer	807958-2	MVS

20 MHz BW IF EQUALIZER ASSEMBLY PN 807619-7

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	Filter Feedthru	88212-15	Erie 1250-003
	Lug No. 8	88225	
	Housing	807853-2	MVS
	Cover	807854-3	MVS
	IF Filter PWB	805482-1	MVS
	Capacitor, 1.5	89016	CK05
	Wire Harness Assembly	809996-1	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
20 MHz BW IF EQUALIZER ASSEMBLY PN 807619-8			
	Filter Feedthru	88212-15	Erie 1250-003
	Lug No. 8	88225	
	Filter Board Assembly	806741-1	MVS
	Housing	807853-2	MVS
	Cover	807854-3	MVS
	Wire Harness Assembly	809996-1	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
IF FILTER EQUALIZER ASSEMBLY PN 802030-1			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1	20 pF	88212-17	CM05ED200J03
C3	Variable, 15-60 pF	88136	Matsushita
C4,C5	82 pF	89081	CM05ED820J03
C6	Variable, 15-60 pF	88136	Matsushita
C8	20 pF	88212-17	CM05ED200J03
C9,C10	5 pF	89078	CM05ED050J03
C11,C12	62 pF	89007-2	CM05ED620J03
C13	20 pF, 5%	89008-5	CM05ED200J03
C14	Variable, 1.7-10 pF	89017-31	Matsushita ECV1ZW10P
	CONNECTORS		
J1,J2,J3,J4	Connector	88358-10	Sealectro 51-151-0000
	Standoff	88510-3	Cambion 2188-11
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1	Coil Form Assembly 5-3/4T	801433-2	MVS
L2	Coil Form Assembly 2-3/4	801433-3	MVS
L3	Coil Form Assembly 3-3/4	801433-4	MVS
L4	Coil Form Assembly 2-3/4	801433-3	MVS
L5	Coil Form Assembly 5-3/4	801433-2	MVS
L6	Coil Form Assembly 3-1/2	801214-3	MVS
L7	Coil, 4-1/2T	801214-5	MVS

IF FILTER PWB ASSEMBLY PN 806741-1

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1	0.001, 200V	87210	Vitramon CK05BX102K
C2	1.5, 50V	89016	Kemet K1R5W50
C3	0.001, 200V	87210	Vitramon CK05BX102K
C4	82 pF	89081	CM05ED820J03
C5	Variable, 2.3-20 pF	89017-32	Matsushita ECV-1ZW10P20
C6	5 pF	89078	CM05CD050D03
C7	39 pF	89097	CM05ED390J03
C8	27 pF	89017-21	CM05ED270J03
C9	56 pF	89008-67	CM05ED560J03
C11	24 pF	89076	CM05ED240J03
C12	82 pF	89081	CM05ED820J03
C13	47 pF	88212-1	CM05ED470J03
C14	10 pF	89116	CM05CD100D03
C15	1 pF	89017-31	CM05CD010D03
C16	Variable, 1.7-10 pF	89017-31	Matsushita ECV-1ZW10P
C17,C18	10 pF	89116	CM05CD100D03
C19	0.001, 200V	87210	Vitramon CK05BX102K
C20	1 pF	89008-7	CM05CD010D03
C21	0.01, 200V	87211	Vitramon CK06BX103K
C22	0.001, 200V	87210	Vitramon CK05BX102K
C23	1.5, 50V	89016	Kemet K1R5W50
C24	0.001, 200V	87210	Vitramon CK05BX102K
	TERMINALS		
E1,E2	Terminal	89383	CTC 3653-2
	CONNECTORS		
J1,J2	Connector	88358-10	Sealectro 51-151-0000
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1	2¼T	803378-39	MVS
L2	3½	803378-40	MVS
L3	6½	803378-41	MVS
L4	1¾	803378-42	MVS
L5	6¾	803378-43	MVS
L6	6¾	803378-44	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	TRANSISTORS		
Q1,Q2,Q3	2N5109	87223-40	
	RESISTORS		
All resistors are ¼W 5% ohms unless otherwise specified.			
R1	73.2, 1%	89256-40	RN55D73R2F
R2	6.2K	89200-5	RC07GF622J
R3	9.1K	89200-12	RC07GF912J
R4	100	89202	RC07GF101J
R5	330, ½W	88025	RC20GF331J
R6	22	89238	RC07GF220J
R7	47	89201	RC07GF470J
R8	220	89233	RC07GF221J
R9	820	89207	RC07GF821J
R10	200	89484	RC07GF201J
R11	680	89206	RC07GF681J
R12	510	89481-19	RC07GF511J
R13	180	89200-3	RC07GF181J
R14	75	89280	RC07GF750J
R15,R16	150, ½W	88018	RC20GF151J
R17	22	89238	RC07GF220J

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
PHASE EQUALIZER ASSEMBLY PN 807958-1			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1	10 pF	89116	CM05ED010J03
C2	Variable, 3.2-18 pF	89017-29	Matsushita
C3,C4	120 pF	89017-12	CM05ED121J03
C6	Variable, 2.3-20 pF	89017-32	Matsushita ECV-1ZW20P
	CONNECTORS		
J1,J2	Female, Push-On	88358-10	Sealectro 51-151-0000
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1	2-1/2T	803378-45	MVS
L2	6-1/2T	803378-41	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
PHASE EQUALIZER ASSEMBLY PN 807958-2			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1	10 pF	89116	CM05ED100J03
C2	Variable, 3.2-18 pF	89017-29	Matsushita
C3,C4	82 pF	89081	CM05ED820J03
C6	Variable, 2.3-20 pF	89017-32	Matsushita ECV-1ZW20P
	CONNECTORS		
J1,J2	Female, Push-On	88358-10	Sealectro 51-151-0000
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1	3-1/2T	803378-58	MVS
L2	6-1/2T	803378-41	MVS

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
IF FILTER PWB ASSEMBLY PN 805482			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1,C2,C3	0.001, 200V 1%	87210	Vitramon CK05BX102K
C4	Variable 1.8-10 pF	89017-28	Matsushita ECV1ZW10P50
C5	1 pF, 5%	89008-7	DM5CC010A
C6	82 pF	89081	CM05ED820J03
C7	36 pF	89094	CM05ED360J03
C8	27 pF	89017-21	CM05ED270J03
C9	82 pF	89081	CM05ED820J03
C10	1 pF, 5%	89008-7	DM5CC010A
C11	Variable 1.8-10 pF	89017-28	Matsushita ECV1ZW10P50
C12	0.001, 200V 1%	87210	Vitramon CK05BX102K
C13	10 pF	89116	CM05DCD100J03
C14,C15,C16,C17,C18,C19,C20	0.001, 200V 1%	87210	Vitramon CK05BX102K
	TERMINALS		
E1,E2	Terminal	89383	CTC 3653-2
	Standoff	88510-3	CTC 2188-11
	CONNECTORS		
J1,J2	Connector	88358-10	Sealectro 51-151-0000
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1,L2,L3	Choke	89169-37	Ferroxcube VK200-10/3B
L4	0.544-0.816	89169-41	CTC 558-7106-09
L5	2-1/2T	803378-18	MVS
L6	0.243-0.297	89161-51	CTC 558-7106-06
L7	0.09-0.11	89161-37	CTC 558-7106-01
L8	2-1/2T	803378-18	MVS
L9	0.544-0.816	89169-41	CTC 558-7106-09
	TRANSISTORS		
Q1,Q2	MPS918	89774	
Q3	2CS1365	87223-37	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	RESISTORS		
All resistors are in 1/4W 5% unless otherwise specified.			
R1	470	89234	RC07GF471J
R2	1K	89220	RC07GF101J
R3	1.8K	88248	RC07GF182J
R4	240	89200-4	RC07GF241J
R5	56	89232	RC07GF560J
R6	470	89234	RC07GF471J
R7	1K	89220	RC07GF101J
R8	2.2K	89222	RC07GF222J
R9	56	89232	RC07GF560J
R10	240, 1/2W, 5%	89575-7	RC20GF241J
R11	1K	89220	RC07GF101J
R12	2.2K	89222	RC07GF222J
R13	75	89280	RC07GF750J
R14	62	89481-18	RC07GF620J
	TRANSFORMERS		
T1,T2	A18	85811-9	
	FERRITE BEADS		
Z1,Z2,Z3	Ferrite Beads	89161-20	

IF AMPLIFIER ASSEMBLY PN 809627-1

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	IF Amplifier PWB Assembly	809524-1	MVS
	Back Plate	803177-2	MVS
	Cover	803139-1	MVS
	Front Panel	806762-9	MVS
	End Plate	806792-3	MVS
	Top and Bottom Extrusion	806665-1	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Connector	804362-1	MVS
	Test Point, White	88513-1	Sealectro 14-7-209
	Test Point, Black	88513-2	Sealectro
J1	Connector	88358-20	Sealectro 51-145-0000
J2	Connector	89396-34	Omni Spectra OMQ3122

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
IF AGC AMPLIFIER PWB ASSEMBLY PN 809524-1			
	CAPACITORS		
All Capacitors are in microfarads unless otherwise specified.			
C1	1 pF	89008-7	DM5
C2,C3,C4	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C5	Variable, 2.3-10 pF	89017-28	Matsushita
C6	0.47, 50V	89719-37	Erie 8131
C7	10 pF	89116	CM05ED100J03
C8	0.47, 50V	89719-37	Erie 8131
C9	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C10	1.5	89016	Kemet
C11	To Be Determined		
C12	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C13	6.8, 35V	89719-58	Orange Drop
C14,C15	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C16	Variable, 1.7-11 pF	89100-22	Matsushita
C17	1.5	89016	Kemet
C18	0.1	88212-14	CK06
C19,C20	1.5	89016	Kemet
C21	100 pF	89086	CM05ED101J03
C22	1.5	89016	Kemet
C23	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C24	1.5	89016	Kemet
C25	10 pF	89116	CM05ED100J03
C26,C27,C28,C29	0.001	89007-14	
C30	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C31	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C32,C33	0.001	89007-14	
C34	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C35,C36	1.5	89016	Kemet
C37	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C38	0.1	88212-14	CK06
C39	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C40	100, 25V	89719-64	Mallory TDC 10/M025G2
C41	0.001, 200V, 1%	87210	Vitramon CK05BX102K
C42,C43	0.001	89007-14	
C44	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C45	0.001	89007-14	
C46,C47	0.001	89007-22	ATC 700-8-102-M-M5-50M
C48	0.001	89007-14	
C49,C50	0.001	89007-22	ATC 700-8-102-M-M5-50M

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
C51	0.001	89007-14	
C52	0.001	89007-22	ATC 700-8-102-M-M5-50M
C53	0.001	89007-14	
C54	0.001	89007-22	ATC 700-8-102-M-M5-50M
C55	0.001	89007-14	
C57	0.001	89007-22	ATC 700-8-102-M-M5-50M
C58	0.001	89007-14	
C59	0.001	89007-22	ATC 700-8-102-M-M5-50M
C60	0.001	89007-14	
C61,C62	0.001	89007-22	ATC 700-8-102-M-M5-50M
C63	82 pF	89008-72	CM05ED820J03
C64	15 pF	89008-39	DM5
	DIODES		
CR1,CR2	HP5082-2835	89440-73	Hewlett Packard
CR3	1N914A	89405	
CR4	HP5082-2835	89440-73	Hewlett Packard
CR5	1N914A	89405	
CR6	Zener, 1N823B	89437	
CR7	Zener, 1N5231	89440-91	
CR8	Zener, 1N823B	89437	
CR9,CR10,CR11,CR12,CR13, CR14,CR15,CR16,CR17	MA47111	89440-93	MVS
	TERMINALS		
E2,E3	Pin	88197-49	CTC 2971-2
E4,E5,E6,E7,E8,E9, E10,E11,E12,E13,E14, E15,E16,E19,E20	Turret	89383	CTC 3653-2
	RELAYS		
K1	Relay	89800-20	Teledyne 712D-26
	SOCKETS		
K1	Socket, 10 Pin	89976-82	Augat
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1,L2,L3,L4,L5,L6,L7,L8	Choke	89169-37	Ferroxcube VK200-10/3B
L9	6.8	89169-64	Delevan 1025-40
L10	Choke	89169-37	Ferroxcube VK200-10/3B
L11	6.8	89169-64	Delevan 1025-40
L12	Choke	89169-37	Ferroxcube VK200-10/3B
L13	6.8	89169-64	Delevan 1025-40

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
L14	Choke	89169-37	Ferroxcube VK200-10/3B
L15	0.22	89169-47	Delevan 1025-04
L16	0.33	89169-3	Delevan 1025-08
L17	6.8	89169-64	Delevan 1025-40
L18	0.1	89169-63	Delevan 1025-94
L19	0.15	89169-49	Delevan 1025-00
L20	0.39	89169-48	Delevan 1025-10
	TRANSISTORS		
Q1	2SC1426	87223-45	NEC
Q2	2SC1365	87223-37	NEC
Q3	LM394H	89888-3	National Semi-Conductor
Q4,Q5	2N3906	89727	Motorola
Q6,Q7,Q8,Q9	MPS-A55	87223-19	Motorola
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R1	75, 1/8W, 1%	87456	RN55D75R0F
R2	330, 1/2W, 5%	88025	RC20GF330J
R3	100, 1/8W, 1%	89459	RN55D100RF
R4	301, 1/8W, 1%	89327-42	RN55D301RF
R5	47K	89229	RC07GF473J
R6	470K	89200-1	RC07GF474J
R7	20K	89200-14	RC07GF203J
R8	47K	89229	RC07GF473J
R9,R10	121K, 1/8W, 1%	88280	RN55D121RF
R11	18.2K, 1/8W, 1%	88274	RN55D18R2F
R12	10K, 1/8W, 1%	89326	RN55D1001F
R13	23.7K, 1/8W, 1%	88277	RN55D23R7F
R14	121K, 1/8W, 1%	88280	RN55D121RF
R15	1K, 1/8W, 1%	87460	RN55D1001F
R16	2K	89488	RC07GF201J
R17	10K, 1/8W, 1%	89326	RN55D1001F
R18	47K	89229	RC07GF473J
R19,R20,R21	1K	89220	RC07GF101J
R22	150	89204	RC07GF151J
R23	374, 1/8W, 1%	89327-37	RN55D374RF
R24	390	89180	RC07GF391J
R25	374, 1/8W, 1%	89327-37	RN55D374RF
R26	270, 1W, 5%	88055	RC32GF271J
R27	1K, 1/8W, 1%	87460	RN55D1001F
R28	6.49K, 1/8W, 1%	89315	RN55D6R49F
R29	Potentiometer, 1K	88453-26	Helitrim 82PR
R30	10	89231	RC07GF100J
R31	121K, 1/8W, 1%	88280	RN55D121RF

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R32	1K, 1%	89737-5	Tel-Labs Q81
R33	2K	89488	RC07GF201J
R34	18.2K, 1/8W, 1%	88274	RN55D18R2F
R35	5.62K, 1/8W, 1%	89256-94	RN55D5R62F
R36	1.21K, 1/8W, 1%	89256-13	RN55D1R21F
R37	20K	89200-14	RC07GF203J
R38	Potentiometer, 1K	88453-26	Helitrim 82PR
R39	220	89233	RC07GF221J
R40	2K	89488	RC07GF201J
R41	825, 1/8W, 1%	87462	RN55D825RF
R42	1.3K	89200-26	RC07GF132J
R43	2.67K, 1/8W, 1%	87463	RN55D2R67F
R44	1K	89220	RC07GF101J
R45	6.49K, 1/8W, 1%	89315	RN55D6R49F
R46	56.2K, 1/8W, 1%	89319	RN55D56R2F
R47	147K, 1/8W, 1%	88281	RN55D147RF
R48	100	89202	RC07GF101J
R49	1K	89220	RC07GF101J
R50	10K, 1/8W, 1%	89326	RN55D1001F
R51	1K	89220	RC07GF101J
R52	10K, 1/8W, 1%	89326	RN55D1001F
R53	47	89201	RC07GF470J
R54	220	89233	RC07GF221J
R55	10K, 1/8W, 1%	89326	RN55D1001F
R56	5.1K	89491	RC07GF512J
R58	47	89201	RC07GF470J
R59	220	89233	RC07GF221J
R60	Potentiometer, 10K	88453-31	Helitrim 62PR
R61	2.15K, 1/8W, 1%	89337	RN55D2R15F
R62	1M	89238-30	RC07GF105J
R63	46.4, 1/8W, 1%	87451	RN55D46R4F
R64	220	89233	RC07GF221J
R65	390	89180	RC07GF391J
R66	1.21K, 1/2W, 1%	89575-9	RN60D1R21F
R67	220	89233	RC07GF221J
R68	47	89201	RC07GF470J
R69	390	89180	RC07GF391J
R70	4.99K, 1/8W, 1%	89256-93	RN55D4R99F
R71	47	89201	RC07GF470J
R72	220	89233	RC07GF221J
R73	1.21K, 1/2W, 1%	89575-9	RN60D1R21F
R74,R75	47	89201	RC07GF470J
R76	4.99K, 1/8W, 1%	89256-93	RN55D4R99F
R77	5.23K, 1/8W, 1%	89313	RN55D5R23F
R78	390	89180	RC07GF391J
R79	1.21K, 1/2W, 1%	89575-9	RN60D1R21F
R80	47	89201	RC07GF470J
R82	4.99K, 1/8W, 1%	89256-93	RN55D4R99F
R83	88.7, 1/8W, 1%	88296	RN55D88R7F
R84,R85,R82	422, 1/8W, 1%	89327-48	RN55D422RF

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R87	42.2, 1/8W, 1%	87450	RN55D42R2F
R88	Potentiometer, 5K	88453-57	Bournes 3339P
R89,R90	5.1K	89491	RC07GF512J
	INTEGRATED CIRCUITS		
U1,U2,U3	LM258AH	89889-22	
U4,U5	LF256H	89976-83	
U6	LM258AH	89889-22	
U7,U8,U9	MWA-120	89889-40	Motorola
U10	MWA-130	89889-72	Motorola
	SHORTING PLUG		
W1	Shorting Plug	88510-44	CTC 450-3775-01-03-16
W2	Jumper	88328-7	

VIDEO DEMODULATOR ASSEMBLY PN 809628-1

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	Video Demodulator PWB Assembly	809580-1	MVS
	Back Plate	803177-1	MVS
	Cover	803139-1	MVS
	Front Panel	806762-10	MVS
	End Plate	809678-1	MVS
	Top and Bottom Extrusion	803356-1	MVS
	Card Puller	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Harness Assembly	807961-1	MVS
	Connector	804362-1	MVS
	Connector	89396-34	Omni Spectra OMQ312
	Connector	88358-20	Sealectro 51-145-0000
	Cable Assembly	803447-8	MVS
	Test Point, White	88513-1	Sealectro 14-7-209
	Test Point, Black	88513-2	Sealectro
FL1,FL2,FL3	Filtercons	89971	Erie 1201-052
Q106	Voltage Regulator μA7805	89976-94	
S1	Switch	89920-35	SPST 87-31-11

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
VIDEO DEMODULATOR PWB ASSEMBLY PN 809580-1			
	CAPACITORS		
All Capacitors are in microfarads unless otherwise specified.			
C1,C2	0.001, 200V 1%	87210	Vitramon CK05BX102K
C3	1.5, 50V	89016	Kemet K1R5W50
C4,C5	0.001, 200V 1%	87210	Vitramon CK05BX102K
C6	39 pF	89097	CM05ED390J03
C7,C8	0.001, 200V 1%	87210	Vitramon CK05BX102K
C9	1.5, 50V	89016	Kemet K1R5W50
C10	0.001, 200V 1%	87210	Vitramon CK05BX102K
C11	Variable 2.8-10 pF	89017-28	Matsushita
C12	Variable, 3.2-18 pF	89017-29	Matsushita
C13,C14	15 pF	89117	CM05ED150J03
C15	0.001, 200V 1%	87210	Vitramon CK05BX102K
C16	1 pF	89017-13	CM05ED010J03
C17	100, 25V	89139-19	Hilton SWT25Z100
C18	Variable, 3.2-18 pF	89017-29	Matsushita
C19	100, 25V	89139-19	Hilton SWT25Z100
C20	1.5, 50V	89016	Kemet K1R5W50
C21	10 pF	89116	CM05ED100J03
C22	1.5, 50V	89016	Kemet K1R5W50
C23	1000 pF	89099	CM06
C24	330 pF	89089	CM05ED331J03
C25	1, 35V	89719-51	Hilton SWT35Z1
C26	1.5, 50V	89016	Kemet K1R5W50
C27	100, 25V	89139-19	Hilton SWT25Z100
C28	1.5, 50V	89016	Kemet K1R5W50
C29	100 pF	89086	CM05ED101J03
C30	360 pF	89088	CD15
C31	0.001, 200V 1%	87210	Vitramon CK05BX102K
C32	Variable 2.8-10 pF	89017-28	Matsushita
C33	10 pF	89116	CM05ED100J03
C34	6.8, 35V	89719-58	Orange Drop
C35	10, 25V	89719-9	Orange Drop
C36	1.5, 50V	89016	Kemet K1R5W50
C37	0.001, 200V 1%	87210	Vitramon CK05BX102K
C38	100, 25V	89139-19	Hilton SWT25Z100
C39	1.5, 50V	89016	Kemet K1R5W50
C40	1, 35V	89719-51	Hilton SWT35Z1
C41	82 pF	89081	CM05ED820J03
C42	100, 25V	89139-19	Hilton SWT25Z100
C43	Variable, 3.2-18 pF	89017-29	Matsushita
C44	400, 15V	89719-46	Hilton SWT15Z400
C45	100, 25V	89139-19	Hilton SWT25Z100
C46	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C47	470 pF, 1%	89008-29	CM05ED471J03
C48	1, 35V	89719-51	Hilton SWT35Z1
C49	0.01, 200V, 1%	87211	Vitramon CK06BX103K

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
C50	1.5, 50V	89016	Kemet K1R5W50
C51	8.2, 15V	89765	Kemet K8R2W15
C52	30 pF	89017-58	CM05ED300J03
C53	0.1	88212-14	CK06
C54	100, 25V	89139-19	Hilton SWT25Z100
C55	0.1	88212-14	CK06
C57	0.01, 200V, 1%	87211	Vitramon CK06BX103K
	DIODES		
CR1,CR2	HP2302	89440-22	Hewlett Packard
CR3,CR4	FD700	89440-35	
CR5	LM113, 1.2V, Zener	89440-83	
CR6,CR7	HP2800	89424	Hewlett Packard
CR8	1N5234B, 6.2V, Zener	89438-6	
CR9	1N758A, 10V, Zener	89438-15	
CR10	1N914A	89405	
CR11	CR330, 3.3 mA	89440-92	
CR12	1N758A, 10V, Zener	89438-15	
CR13,CR14	1N914A	89405	
CR15	CR330, 3.3 mA	89440-92	
CR16,CR17	HP2800	89424	Hewlett Packard
CR18,CR19	1N914A	89405	
	TERMINALS		
E1,E2,E3,E4,E5,E6,E7, E8,E9,E10,E11,E12,E13,E14, E16,E17,E18,E19	Turret	89383	CTC 3653-2
	CONNECTORS		
J1	Connector	88358-10	Sealectro 51-151-0000
	RELAYS		
K1	Relay	89980-45	Sigma 191TE1C1-12G
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1,L2	Choke	89169-37	Ferroxcube VK200-10/3B
L3	0.22	89169-47	Delevan 1025-04
L4	1	89169-40	Delevan 1025-20
L5	Choke	89169-37	Ferroxcube VK200-10/3B
L6,L7	100	89169-60	Cadell Burns 6470-10

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	TRANSISTORS		
Q1,Q2	SS4355	87510	Motorola
Q3	2SC1426	87223-45	
Q4	SS4355	87510	Motorola
Q5	2N3906	89727	Motorola
Q6	2N3904	89700	Motorola
Q7,Q8,Q9	2N3906	89727	Motorola
Q10,Q11	2N3904	89700	Motorola
Q13	2N3904	89700	Motorola
Q14,Q15	2N3906	89727	Motorola
Q16	2N2905	89728-12	Motorola
Q17	2N3904	89700	Motorola
Q18	2N3906	89727	Motorola
Q19	2N5457	87223-71	
Q20	2N3904	89700	Motorola
Q21	2N3906	89727	Motorola
Q22	2N3904	89700	Motorola
	RESISTORS		
All resistors are in 1/4W, 5% ohms unless otherwise specified.			
R1	649, 1/8W, 1%	89256-25	RN55D649RF
R2	560	89235	RC07GF561J
R3	330, 1/2W, 5%	88026	RC20GF391J
R4	2K	89488	RC07GF201J
R5	330, 1/2W, 5%	88025	RC20GF331J
R6	120	89203	RC07GF121J
R7	100	89202	RC07GF101J
R8	390	89180	RC07GF391J
R9	6.8K	89182	RC07GF682J
R10	10	89231	RC07GF100J
R11	560	89235	RC07GF561J
R12	2K	89488	RC07GF201J
R13	300, 1/2W, 5%	88538-4	RC20GF301J
R14	1K, 1/2W, 5%	89242	RC07GF101J
R15	Potentiometer, TBD		Helitrim 82P
R16	Potentiometer, 500	88453-36	Helitrim 82P
R17	10	89231	RC07GF100J
R18	20K	89200-14	RC07GF203J
R19	470	89234	RC07GF471J
R20	62	89481-18	RC07GF620J
R21	470	89234	RC07GF471J
R22	1K	89220	RC07GF101J
R23	20K	89200-14	RC07GF203J
R24	Potentiometer, 1K	88453-26	Helitrim 82P
R25	51	89238-38	RC07GF510J

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R26	680	89206	RC07GF681J
R27	150K	88246	RC07GF154J
R28	22K	89228	RC07GF223J
R29	820	89207	RC07GF821J
R30	1K	89220	RC07GF101J
R31	160	89200-13	RC07GF161J
R32	10	89231	RC07GF100J
R33	1.5K	89236	RC07GF152J
R34	100	89202	RC07GF101J
R35	120	89203	RC07GF121J
R36	Potentiometer, 1K	88453-26	Helitrim 82P
R37	Potentiometer, 100	88453-33	Helitrim 82P
R38	10K	89227	RC07GF103J
R39	750	89487	RC07GF751J
R40	2K	89488	RC07GF201J
R41,R42	10K	89227	RC07GF103J
R43	100K	89278	RC07GF104J
R44	47K	89229	RC07GF473J
R45,R46	10K	89227	RC07GF103J
R47	1.5K	89236	RC07GF152J
R48	3K	89490	RC07GF301J
R49	2K	89488	RC07GF201J
R50	47K	89229	RC07GF473J
R51	17.4, 1/8W, 1%	89256-45	RN55D17R4F
R52	68	89482	RC07GF680J
R53	56	89232	RC07GF560J
R54	649, 1/8W, 1%	89256-25	RN55D649RF
R55	Potentiometer, 2K	88453-79	Helitrim 82PA
R56	10	89231	RC07GF100J
R57	220	89233	RC07GF221J
R58,R59	1K	89220	RC07GF101J
R62	10	89231	RC07GF100J
R63	200	89484	RC07GF201J
R64	1.8K	88248	RC07GF182J
R65	470	89234	RC07GF471J
R66	8.2K	89237	RC07GF822J
R67	1K	89220	RC07GF101J
R68	Potentiometer, 1K	88453-26	Helitrim 82P
R69	300	89486	RC07GF301J
R70	22	89238	RC07GF220J
R71	1K	89220	RC07GF101J
R72	22K	89228	RC07GF223J
R73	100	89202	RC07GF101J
R74	510	89481-19	RC07GF511J
R75	27	89200	RC07GF270J
R76	51	89238-38	RC07GF510J
R77	430	89238-31	RC07GF431J
R78	33	89478	RC07GF330J
R79	1K	89220	RC07GF101J
R80	20	89477	RC07GF200J
R81	10	89231	RC07GF100J

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R82	330	89205	RC07GF331J
R83	33	89478	RC07GF330J
R84,R85,R86	1K	89220	RC07GF101J
R87	220	89233	RC07GF221J
R88	10	89231	RC07GF100J
R89	1M	89238-30	RC07GF105J
R90	15K	89275	RC07GF153J
R91	470K	89200-1	RC07GF474J
R92	10K	89227	RC07GF103J
R93	100K	89278	RC07GF104J
R94	68K	89276	RC07GF683J
R95	2K	89488	RC07GF201J
R96	3.9K	89224	RC07GF392J
R97	68K	89276	RC07GF683J
R98	75, 1/8W, 1%	87456	RN55D75R0F
R99	10K	89227	RC07GF103J
R100	100K	89278	RC07GF104J
R101	910	89200-19	RC07GF911J
R102,R103	75, 1/8W, 1%	87456	RN55D75R0F
R104	100K	89278	RC07GF104J
R105	1.5K	89236	RC07GF152J
	SWITCHES		
S1	Switch	89920-41	CTS SPST206-2

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR PN 807926-1			
	Subcarrier Demodulator PWB Assembly	805220-5/-15	MVS
	Top Rail Extrusion	805280-1	MVS
	Front Panel	806762-4	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Tinnerman Strip	803357-5	MVS
	Bottom Rail Extrusion	805281-1	MVS
	Test Point, White	88513-1	Sealectro 147-209
	Test Point, Black	88513-2	Sealectro 14-00-702
	Lamp, Indicator Red	89904-13	Shelly Assoc. LC1-R
	Backplate	803177-2	MVS
	RF Connector	88358-20	Sealectro 51-145-0000
	Cover	803139-1	MVS
	Coax Cable, 50 Ohms	805289-2	MVS
W1	Coax Cable, 50 Ohms	805289-6	MVS
E34,E35	Ground Lug	88520-14	
FL2,FL3,FL4,FL5, FL6,FL7,FL8,FL9	Filter, 1500 pF	88212-15	Erie 1250-003
L11,L12	Coil, 136	809739-1	AC8005
L13	Coil, 19	809765-1	AC8006
Q19	Transistor, MJE1102	87223-28	Motorola
Q20	Transistor, MJE1092	87223-29	Motorola
Y1	Crystal, 15.530 MHz	89525-32	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR PN 807926-2			
	Subcarrier Demodulator PWB Assembly	805220-6/-16	MVS
	Top Rail Extrusion	805280-1	MVS
	Front Panel	806762-4	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Tinnerman Strip	803357-5	MVS
	Bottom Rail Extrusion	805281-1	MVS
	Test Point, White	88513-1	Sealectro 147-209
	Test Point, Black	88513-2	Sealectro 14-00-702
	Lamp, Indicator Red	89904-13	Shelly Assoc. LC1-R
	Backplate	803177-2	MVS
	RF Connector	88358-20	Sealectro 51-145-0000
	Cover	803139-1	MVS
	Coax Cable, 50 Ohms	805289-2	MVS
W1	Coax Cable, 50 Ohms	805289-6	MVS
E34,E35	Ground Lug	88520-14	
FL2,FL3,FL4,FL5, FL6,FL7,FL8,FL9	Filter, 1500 pF	88212-15	Erie 1250-003
L11,L12	Coil, 136	809739-1	AC8005
L13	Coil, 19	809765-1	AC8006
Q19	Transistor, MJE1102	87223-28	Motorola
Q20	Transistor, MJE1092	87223-29	Motorola
Y1	Crystal, 16.500 MHz	89525-34	

SUBCARRIER DEMODULATOR PN 807926-3

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	Subcarrier Demodulator PWB Assembly	805220-4/-14	MVS
	Top Rail Extrusion	805280-1	MVS
	Front Panel	806762-4	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Tinnerman Strip	803357-5	MVS
	Bottom Rail Extrusion	805281-1	MVS
	Test Point, White	88513-1	Sealectro 147-209
	Test Point, Black	88513-2	Sealectro 14-00-702
	Lamp, Indicator Red	89904-13	Shelly Assoc. LC1-R
	Backplate	803177-2	MVS
	RF Connector	88358-20	Sealectro 51-145-0000
	Cover	803139-1	MVS
	Coax Cable, 50 Ohms	805289-2	MVS
W1	Coax Cable, 50 Ohms	805289-6	MVS
E34,E35	Ground Lug	88520-14	
FL2,FL3,FL4,FL5, FL6,FL7,FL8,FL9	Filter, 1500 pF	88212-15	Erie 1250-003
L11,L12	Coil, 136	809739-1	AC8005
L13	Coil, 19	809765-1	AC8006
Q19	Transistor, MJE1102	87223-28	Motorola
Q20	Transistor, MJE1092	87223-29	Motorola
Y1	Crystal, 16.900 MHz	89525-28	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR PN 807926-4			
	Subcarrier Demodulator PWB Assembly	805220-4/-14	MVS
	Top Rail Extrusion	805280-1	MVS
	Front Panel	806762-4	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Tinnerman Strip	803357-5	MVS
	Bottom Rail Extrusion	805281-1	MVS
	Test Point, White	88513-1	Sealectro 147-209
	Test Point, Black	88513-2	Sealectro 14-00-702
	Lamp, Indicator Red	89904-13	Shelly Assoc. LC1-R
	Backplate	803177-2	MVS
	RF Connector	88358-20	Sealectro 51-145-0000
	Cover	803139-1	MVS
	Coax Cable, 50 Ohms	805289-2	MVS
W1	Coax Cable, 50 Ohms	805289-6	MVS
E34,E35	Ground Lug	88520-14	
FL2,FL3,FL4,FL5, FL6,FL7,FL8,FL9	Filter, 1500 pF	88212-15	Erie 1250-003
L11,L12	Coil, 136	809739-1	AC8005
L13	Coil, 19	809765-1	AC8006
Q19	Transistor, MJE1102	87223-28	Motorola
Q20	Transistor, MJE1092	87223-29	Motorola
Y1	Crystal, 17.500 MHz	89525-29	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR PN 807926-5			
	Subcarrier Demodulator PWB Assembly	805220-4/-14	MVS
	Top Rail Extrusion	805280-1	MVS
	Front Panel	806762-4	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Tinnerman Strip	803357-5	MVS
	Bottom Rail Extrusion	805281-1	MVS
	Test Point, White	88513-1	Sealectro 147-209
	Test Point, Black	88513-2	Sealectro 14-00-702
	Lamp, Indicator Red	89904-13	Shelly Assoc. LC1-R
	Backplate	803177-2	MVS
	RF Connector	88358-20	Sealectro 51-145-0000
	Cover	803139-1	MVS
	Coax Cable, 50 Ohms	805289-2	MVS
W1	Coax Cable, 50 Ohms	805289-6	MVS
E34,E35	Ground Lug	88520-14	
FL2,FL3,FL4,FL5, FL6,FL7,FL8,FL9	Filter, 1500 pF	88212-15	Erie 1250-003
L11,L12	Coil, 136	809739-1	AC8005
L13	Coil, 19	809765-1	AC8006
Q19	Transistor, MJE1102	87223-28	Motorola
Q20	Transistor, MJE1092	87223-29	Motorola
Y1	Crystal, 18.200 MHz	89525-30	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR PN 807926-6			
	Subcarrier Demodulator PWB Assembly	805220-4/-14	MVS
	Top Rail Extrusion	805280-1	MVS
	Front Panel	806762-4	MVS
	Pull Module	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Tinnerman Strip	803357-5	MVS
	Bottom Rail Extrusion	805281-1	MVS
	Test Point, White	88513-1	Sealectro 147-209
	Test Point, Black	88513-2	Sealectro 14-00-702
	Lamp, Indicator Red	89904-13	Shelly Assoc. LC1-R
	Backplate	803177-2	MVS
	RF Connector	88358-20	Sealectro 51-145-0000
	Cover	803139-1	MVS
	Coax Cable, 50 Ohms	805289-2	MVS
W1	Coax Cable, 50 Ohms	805289-6	MVS
E34,E35	Ground Lug	88520-14	
FL2,FL3,FL4,FL5, FL6,FL7,FL8,FL9	Filter, 1500 pF	88212-15	Erie 1250-003
L11,L12	Coil, 136	809739-1	AC8005
L13	Coil, 19	809765-1	AC8006
Q19	Transistor, MJE1102	87223-28	Motorola
Q20	Transistor, MJE1092	87223-29	Motorola
Y1	Crystal, 19.000 MHz	89525-47	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR PWB ASSEMBLY PN 805220			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1	0.001, 200V 1%	87210	Vitramon CK05BX102K
C2	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C3,C4,C5,C6,C7	See Table		
C8	0.001, 200V 1%	87210	Vitramon CK05BX102K
C9	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C10	120 pF	89017-12	CM05ED121J03
C11	330 pF	89089	CM05ED331J03
C12,C13	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C14	0.001, 200V 1%	87210	Vitramon CK05BX102K
C15	1.5, 50V	89016	Kemet K1R5W50
C16,C17,C18	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C19	5 pF	89017-50	CM05ED005J03
C20,C21,C22	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C23	0.001, 200V 1%	87210	Vitramon CK05BX102K
C24,C25	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C26	0.001, 200V 1%	87210	Vitramon CK05BX102K
C27	0.1	88212-14	CK06BX104K
C28	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C29	1.5, 50V	89016	Kemet K1R5W50
C30,C31	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C32,C33	10, 25V	89719-9	Hilton SWT25Z10
C34	33 pF, 5%	89008-47	DM5300WVDC
C35,C36	1 pF, 5%	89008-7	DM5CC010A
C37	33 pF, 5%	89008-47	DM5300WVDC
C38,C39,C40	10, 25V	89719-9	Hilton SWT25Z10
C41	2.2, 60V	89719-14	Hilton SWT60Z22
C42	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C43	1.5, 50V	89016	Kemet K1R5W50
C44,C45	6.8, 35V	89060	CS13BF685K
C46	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C47	10, 25V	89719-9	Hilton SWT25Z10
C48	10, 50V	89719-16	Hilton SWT50Z10
C49	1800 pF,400V, 1%	8212-66	Paktron PP481
C50	750 pF	89008-35	DM15
C51	6 pF	89007-20	CM05ED006J03
C52	1800 pF, 400V, 1%	8212-66	Paktron PP481
C53	750 pF	89008-35	DM15
C54	Variable, 15-60 pF	88136	Erie

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
C56,C57	0.01, 200V, 1%	88212-68	Paktron PP460
C58	0.47	89719-37	Erie 8131-050-651-474
C59	3.3 pF	89017-66	Ceramics N750 2U33AJ
C60	1000 pF, 400V, 2%	88212-78	Paktron PP481
C61	10, 25V	89719-9	Hilton SWT25Z10
C62	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C63	10, 25V	89719-9	Hilton SWT25Z10
C64	1.5, 50V	89016	Kemet K1R5W50
C65	100 pF, 1%	89008-22	DM-5FY101
C66	36 pF	89094	CD155Q36
C67,C68,C69	10, 25V	89719-9	Hilton SWT25Z10
C71	0.01, 200V, 1%	87211	Vitramon CK06BX103K
C72	10, 25V	89719-9	Hilton SWT25Z10
C73	10 pF	89116	CD15C5Q1
C74,C75	See Table		
C76,C77	68 pF, 1%	89008-19	DM5
C78	68 pF, 5%	89008-42	CM05ED680J03
	DIODES		
CR1,CR2,CR3,CR4,CR5,CR6	1N914	89405	GE
CR7	1N5314	89440-68	
CR8,CR9	Zener, 1N936A, 9V	89436	
CR10,CR11	1N914	89405	GE
CR12	A114D	89440-10	
	TERMINALS		
E1,E2,E3,E4,E5,E6,E7, E8,E9,E10,E11,E12,E13,E14, E15,E16,E17,E18,E19,E20	Terminal	89383	CTC 3653-2
E21,E22	Slotted	88510-39	CTC 1028-2
E23,E24,E25,E26,E27,E28, E29,E30,E31,E32,B,E,C	Terminal	89383	CTC 3653-2
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1,L2,L3,L4,L5	See Table		
L6	0.544-0.816	89169-41	Cambion 7106-09
L7,L8	100	89169-29	Delevan
L9,L10	3.76-5.64	89161-58	Cambion 7106-14

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	RELAYS		
K1	Relay	89980-45	Sigma 191TE1C1-12G
	TRANSISTORS		
Q1	2N3906	89727	Motorola
Q2	2N3904	89700	Motorola
Q3	40823	87223-72	RCA
Q4,Q5	2N3906	89727	Motorola
Q6,Q7	2N3904	89700	Motorola
Q8	2N3906	89727	Motorola
Q9	2N5551	87223-63	
Q10	2N3906	89727	Motorola
Q11,Q12	2N5400	87223-54	
Q13	2N3904	89700	Motorola
Q14	2N3906	89727	Motorola
Q15	2N3904	89700	Motorola
Q16	2N3906	89727	Motorola
Q17	2N3904	89700	Motorola
Q18	2N3906	89727	Motorola
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R1	10K, 1/8W, 5%	89260	RC05GF103J
R2	5.1K, 1/8W 5%	89260-32	RC05GF512J
R3	75, 1/8W, 5%	89260-33	RC05GF750J
R4	390	89180	RC07GF391J
R5	150, 1/8W, 5%	89260-28	RC05GF151J
R6	10K, 1/8W, 5%	89260	RC05GF103J
R7	1.5K, 1/8W, 5%	89260-64	RC05GF152J
R8	22, 1/8W, 5%	89260-62	RC05GF220J
R9,R10	4.7K, 1/8W, 5%	89260-60	RC05GF472J
R11	560, 1/8W, 5%	89260-41	RC05GF561J
R12	47K, 1/8W, 5%	89260-68	RC05GF473J
R13	27K, 1/8W, 5%	89260-52	RC05GF273J
R14	560, 1/8W, 5%	89260-41	RC05GF561J
R15	6.2K, 1/8W, 5%	89260-65	RC05GF622J
R16	100K, 1/8W, 5%	89260-26	RC05GF104J
R17	100, 1/8W, 5%	89260-18	RC05GF101J
R18,R19	22, 1/8W, 5%	89260-62	RC05GF220J
R20	4.7K, 1/8W, 5%	89260-60	RC05GF472J
R21	2.2K, 1/8W, 5%	89260-43	RC05GF222J
R22	560, 1/8W, 5%	89260-41	RC05GF561J
R23	1.5K, 1/8W, 5%	89260-64	RC05GF152J
R24	2.2K, 1/8W, 5%	89260-43	RC05GF222J

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R25	15K, 1/8W, 5%	89260-50	RC05GF153J
R26	22, 1/8W, 5%	89260-62	RC05GF220J
R27	47K, 1/8W, 5%	89260-68	RC05GF473J
R28	150K, 1/8W, 5%	89260-70	RC05GF154J
R29	2.2K, 1/8W, 5%	89260-43	RC05GF222J
R30	Potentiometer, 5K	88453-32	Helitrim 62PR
R31	4.7K, 1/8W, 5%	89260-60	RC05GF472J
R32	1K	89220	RC07GF101
R33	1K, 1/8W, 5%	89260-24	RC05GF101J
R34,R35	10K, 1/8W, 5%	89260	RC05GF103J
R36	1K, 1/8W, 5%	89260-24	RC05GF101J
R37	470, 1/2W, 5%	88027	RC20GF471J
R38	510, 1/8W, 5%	89260-48	RC05GF511J
R39	47K, 1/8W, 5%	89260-68	RC05GF473J
R40	18K, 1/8W, 5%	89260-56	RC05GF183J
R41	10, 1/8W, 5%	89260-61	RC05GF100J
R42	33K, 1/8W, 5%	89260-16	RC05GF333J
R43	82K, 1/8W, 5%	89260-69	RC05GF823J
R44	1.2K, 1/8W, 5%	89260-53	RC05GF122J
R45	100, 1/8W, 5%	89260-18	RC05GF101J
R46	5.1K, 1/8W 5%	89260-32	RC05GF512J
R47	Potentiometer, 5K	88453-32	Helitrim 62PR
R48,R49	33K, 1/8W, 5%	89260-16	RC05GF333J
R50	560, 1/8W, 5%	89260-41	RC05GF561J
R51	75, 1/8W, 5%	89260-33	RC05GF750J
R52	1, 1/2W, 5%	88538-9	RC20GF100J
R53	62, 1/8W, 5%	89260-30	RC05GF620J
R54	100K, 1/8W, 5%	89260-26	RC05GF104J
R55	47K, 1/8W, 5%	89260-68	RC05GF473J
R56	1K, 1/8W, 5%	89260-24	RC05GF101J
R57	2.2K, 1/8W, 5%	89260-43	RC05GF222J
R58	150, 1/8W, 5%	89260-28	RC05GF151J
R59	Potentiometer, 500	88453-36	Helitrim 62PR
R60,R61	1K, 1/8W, 5%	89260-24	RC05GF101J
R62	2K, 1/8W, 5%	89260-19	RC05GF201J
R63	1K, 1/8W, 5%	89260-24	RC05GF101J
R64,R65	12K, 1/8W, 5%	89260-66	RC05GFR123K
R66,R67	Potentiometer, 100K	88453-65	Helitrim 62PR
R68,R69	1M, 1/8W, 5%	89260-72	RC05GF105J
R70	Potentiometer, 50K	88453-16	CTSX201R503B
R71	1K, 1/8W, 5%	89260-24	RC05GF101J
R72	27K, 1/8W, 5%	89260-52	RC05GF273J
R73	33, 1/8W, 5%	89260-23	RC05GF330J
R74	100K, 1/8W, 5%	89260-26	RC05GF104J
R75	47K, 1/8W, 5%	89260-68	RC05GF473J
R76	10K, 1/8W, 5%	89260	RC05GF103J
R77,R78	22K, 1/8W, 5%	89260-67	RC05GF223J

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R79	330, 1/8W, 5%	89260-31	RC05GF331J
R80	5.1K, 1/8W 5%	89260-32	RC05GF512J
R81,R82	10, 1/8W, 5%	89260-61	RC05GF100J
R83	47K, 1/8W, 5%	89260-68	RC05GF473J
R84	33, 1/8W, 5%	89260-23	RC05GF330J
R85	470K, 1/8W, 5%	89260-71	RC05GF474J
R86	330, 1/8W, 5%	89260-31	RC05GF331J
R87	5.1K, 1/8W 5%	89260-32	RC05GF512J
R88,R89	10, 1/8W, 5%	89260-61	RC05GF100J
R90,R91	See Table		
R92	2.43K, 1/8W, 1%	89311	RN55D2R43F
R93	10.5K, 1/8W, 1%	89256-78	RN55D10R5F

INTEGRATED CIRCUITS

U1	MC1350P	89976-70	
U2	NEee5558T or MC1458	89976-22	
U3	MC1375P	89976-71	
U4	ΩA 739C	89976-9	

FILTERS

	10.7 MHz	805302	MVS

SOCKETS

	Socket	89357-9	CTC 450-3388-01-03
	IC, 14 Pin DIP	89980-78	Augat 314-AG39D

SHORTING PLUG

	Shorting Plug	88510-42	CTC 461-2871-01-03-16

FREQUENCY	6.8 MHz	7.5 MHz	8.3 MHz
GROUP	-4/-14	-5/-15	-6/-16
C3	30 pF	20 pF	56 pF
C4	47 pF	12 pF	33 pF
C5	680 pF	0.0051 1%	0.0015 1%
C6	47 pF	12 pF	33 pF
C7	39 pF	47 pF	75 pF
L1	8-12	54.4-81.6	17.6-26.4
L2	5.44-8.16	26.4-39.6	3.76-5.64
L3	0.544-0.816	0.162-0.198	0.376-0.564
L4	8-12	54.4-81.6	17.6-26.4
L5	17.6-26.4	26.4-39.6	12-18
R90,R91	300 1/4W 5%	300 1/4W 5%	300 1/4 5%

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR ASSEMBLY PN 807548			
	Subcarrier Demodulator Assembly	807528	MVS
	Back Plate	807545-1	MVS
	Front Panel	806762-5	MVS
	Top and Bottom Extrusion	803356-1	MVS
	Module Pull	803912-1	MVS
	Tinnerman Strip	803357-1	MVS
	Term Lug	88520-50	MVS
	Test Point, White	88513-1	Sealectro 14-7-209
	Test Point, Black	88513-2	Sealectro
	Spacer	807547-1	MVS
CR6	Diode, LED Red HP5082-4850	89918-60	Hewlett Packard
J1,J2	Connector	88358-20	Sealectro 51-145-0000

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
SUBCARRIER DEMODULATOR ASSEMBLY PN 807528			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1,C2,C3	0.01, 25V	89014	RMC
C4,C5,C6,C7,C8,C9,C10,C11	See Table		
C12	0.001, 200V	87210	Vitramon CK05BX102K
C13,C14,C15,C16,C17	0.01, 25V	89014	RMC
C18	0.001, 200V	87210	Vitramon CK05BX102K
C19,C20,C21,C22	0.01, 25V	89014	RMC
C23,C24,C24,C26,C27	See Table		
C28	100 pF	89086	CM05ED101J03
C29	0.01, 25V	89014	RMC
C30	910 pF, 1%	89017-5	CM05ED911J03
C31	2400 pF, 1%	89008-38	CM06
C32	130 pF, 1%	89008-69	CM05ED131J03
C33	Variable, 24-115 pF	89100-24	Elmenco C4006/1X
C34	1800 pF, 1%	89008-31	DM19
C35,C36,C37	910 pF, 1%	89017-5	CM05ED911J03
C38	6.8, 35V	89060	CS13
C39	15, 20V	89067	CSR13
C40,C41	220, 40V	89139-45	Siemens 220/40/8118
C42	1, 50V	89068	Hilton SWT50Z1
C43,C44	15, 20V	89067	CSR13
	DIODES		
CR1,CR2	1N6263 or HSCH-1001	89440-86	Motorola or Hewlett Packard
CR3,CR4,CR5	1N914A	89405	
CR7	1N936A, Zener, 9V	89436	
CR8	1N914A	89405	
	TERMINALS		
E1,E2,E3,E4,E5,E6,E7,E8	Terminal	89383	CTC 3653-2
E9,E10,E11	Pins	88197-49	

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	RELAYS		
K1	Relay	89980-45	Sigma 191T-1C1-12G
	INDUCTORS		
All inductors are in microhenries unless otherwise specified.			
L1,L2,L3	3.76-5.64	89161-75	Caddell Burns 6709-14
L4,L5	8-12	89161-42	CTC 558-1706-16
	TRANSISTORS		
Q1	2N5457	87223-71	
Q2	2N3906	89727	Motorola
Q3	2N3904	89700	Motorola
Q4	2N3906	89727	Motorola
Q5,Q6,Q7,Q8	2N3904	Motorola	
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R1	56K	89238-36	RC07GF563J
R2	20K	89200-14	RC07GF203J
R3,R4	1.2K	89227	RC07GF122J
R5	10	89231	RC07GF100J
R6,R7,R8	See Table		
R9	3K	89490	RC07GF301J
R10,R11	See Table		
R12,R13	10	89231	RC07GF100J
R14	2K	88078	RC07GF201J
R15	200	89484	RC07GF201J
R16	20K	89200-14	RC07GF203J
R17	2K	89488	RC07GF201J
R18	39	89480	RC07GF390J
R19	2K	89488	RC07GF201J
R20	10K	89227	RC07GF103J
R21	100K	89278	RC07GF104J
R22	80.6K, 1/8W, 1%	89327-67	RN55D80R6F
R23	1M, 1%	89256-6	RN60D1005F
R24	22M	89238-51	RC07GF225J
R25,R26	3.9K	89224	RC07GF392J
R27	6.8K	89132	RC07GF682J
R28	510, 1/2W, 5%	88538-21	RC20GF511J
R29	330	89205	RC07GF331J
R30,R31	See Table		

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
R32	10	89231	RC07GF100J
R33,R34,R35	10.5K, 1/8W, 1%	89256-78	RN55D10R5F
R36,R37	11K, 1/8W, 1%	89270	RN55D110RF
R38	4.99K, 1/8W, 1%	89256-93	RN55D4R99F
R39	Potentiometer, 1K	88453-47	Bourns 3359P
R40	Potentiometer, 100	88453-44	Bourns 3359P
R41	1.87K, 1/8W, 1%	89327-60	RN55D1R87F
R42	80.6K, 1/8W, 1%	89327-67	RN55D80R6F
R43	Potentiometer, 1K	88453-23	Bourns 3359W
R44	604, 1/8W 1%	89256-33	RN55D604RF
R45,R46	10K	89227	RC07GF103J
R47	46.4K, 1/8W, 1%	89327-24	RN55D46R4F
R48	10K, 1/8W, 1%	89326	RN55D1001F
R49	56.2K, 1/8W, 1%	89319	RN55D56R2F
R50,R51	301, 1/8W, 1%	89327-42	RN55D301RF
R52	422, 1/8W, 1%	89327-48	RN55D422RF
R53	10	89231	RC07GF100J
R54	1.50K, 1/8W, 1%	89256-16	RN55D1R50F
R55	Potentiometer, 1K	88453-47	Bourns 3359P
R56	3.32K, 1/8W, 1%	89481-24	RN55D3R32F
R57	2.4K	89489	RC07GF242J
R58	200	89484	RC07GF201J
	TEST POINTS		
TP1,TP2,TP3,TP4, TP5,TP6,TP7	Terminal	89383	CTC 3653-2
INTEGRATED CIRCUITS			
U1	MC1375P	89976-71	
U2	TL084IJ	899976-96	
U3,U4	µA 741HC	89976-12	
U5	µA 78M12UC, 12V Reg	89889-25	
	SHORTING PLUG		
W1	Shorting Plug	88510-44	CTC 450-3775-01-03-16

REF DES	DESCRIPTION			PART NO.	SIMILAR TO
FREQUENCY	4.5 MHz	4.83 MHz	6.2 MHz	6.8 MHz	7.4/7.5 MHz
GROUP NO.	-1/-11	-2/-12	-3/-13	-4/-14	-5/-15
C4	220 pF	200 pF	110 pF	110 pF	82 pF
C5	50 pF	47 pF	22 pF	22 pF	18 pF
C6	5 pF	5.6 pF	2.2 pF	2.2 F	1.5 pF
C7	220 pF	200 pF	110 pF	110 pF	82 pF
C8	50 pF	47 pF	22 pF	22 pF	18 pF
C9	8 pF	9.1 pF	3.9 pF	3.9 pF	2.7 pF
C10	220 pF	200 pF	110 pF	110 pF	82 pF
C11	50 pF	47 pF	22 pF	22 pF	18 pF
C23	12 pF	22 pF	12 pF	10 pF	8.2 pF
C24	120 pF	100 pF	62 pF	51 pF	39 pF
C25	5 pF	5 pF	2 pF	2 pF	1 pF
C26	5 pF	10 pF	2 pF	2 pF	2 pF
C27	120 pF	100 pF	62 pF	51 pF	39 pF
R6	4.7K	4.3L	9.1K	9.1K	9.1K
R7	220K	180K	180K	270K	110K
R8	56K	47K	47K	62K	27K
R10	2K	2.2K	2.4K	2.4K	2.4K
R11	680	680	560	560	560
R30	12K	4.7K	6.2K	9.1K	12K
R31	9.1K	4.7K	6.2K	9.1K	12K

SECTION 8
ACCESSORIES

SECTION 9
ACCESSORIES AND REMOTE CONTROL

REMOTE INTERFACE UNIT

FUNCTION

The Remote Control Interface Unit (Figure 1) is designed for remote control operation on some of M/A-COM's 21 Channel Receivers. These receivers normally are provided with seven basic RF channels and fourteen offset channels. The Remote Control Interface Unit can be adapted to control 10 Channel Receivers also.

The operator is able to make channel selections using a frequency shift key (FSK) system connected to the Remote Interface Unit at terminal boards TB1 and TB2. The output of the interface is connected via cable to the receiver. The signal is then forwarded to the channel selection switch board. The Receiver must be in REMOTE mode for REMOTE operation.

MECHANICAL DESCRIPTION

The Remote Control Interface Unit is packaged in a standard M/A-COM remote type module. It is designed to be mounted in a standard 19-inch EIA equipment rack adjacent to the Receiver it controls.

FRONT PANEL INDICATORS

The front panel indicators consist of

- 1 to 7 channel indicator lamps
- +,0,– offset indicator lamps
- power monitor lamp

The power lamp illuminates when the unit is powered and in operation. The channel and offset lamps indicate which channel and offset has been selected.

REAR PANEL CONNECTIONS

The rear panel consists of two terminal boards and one output connector. An interconnection wiring diagram is given in Figure 2.

Terminal Board 1 consists of seven input terminals (one for each channel).

Terminal Board 2 consists of seven input terminals also (three used for offset, one for power, one for common, and two for returns).

Output connector J1 is connected via cable to the Receiver it controls (Figure 3).

MAINTENANCE

There is no specific routine maintenance required for the Remote Interface Unit. Proper operation of the unit can be confirmed by simulating operating conditions given in the truth table (Table 1) to verify that the Remote Interface Unit is operational.

If equipment is not working, check

- input signals
- output signals
- Receiver is functioning correctly
- PWB for breaks

TEST EQUIPMENT REQUIRED

DC VTM or (DVM) – Hewlett Packard HP412 or RCA Volt Ohmist

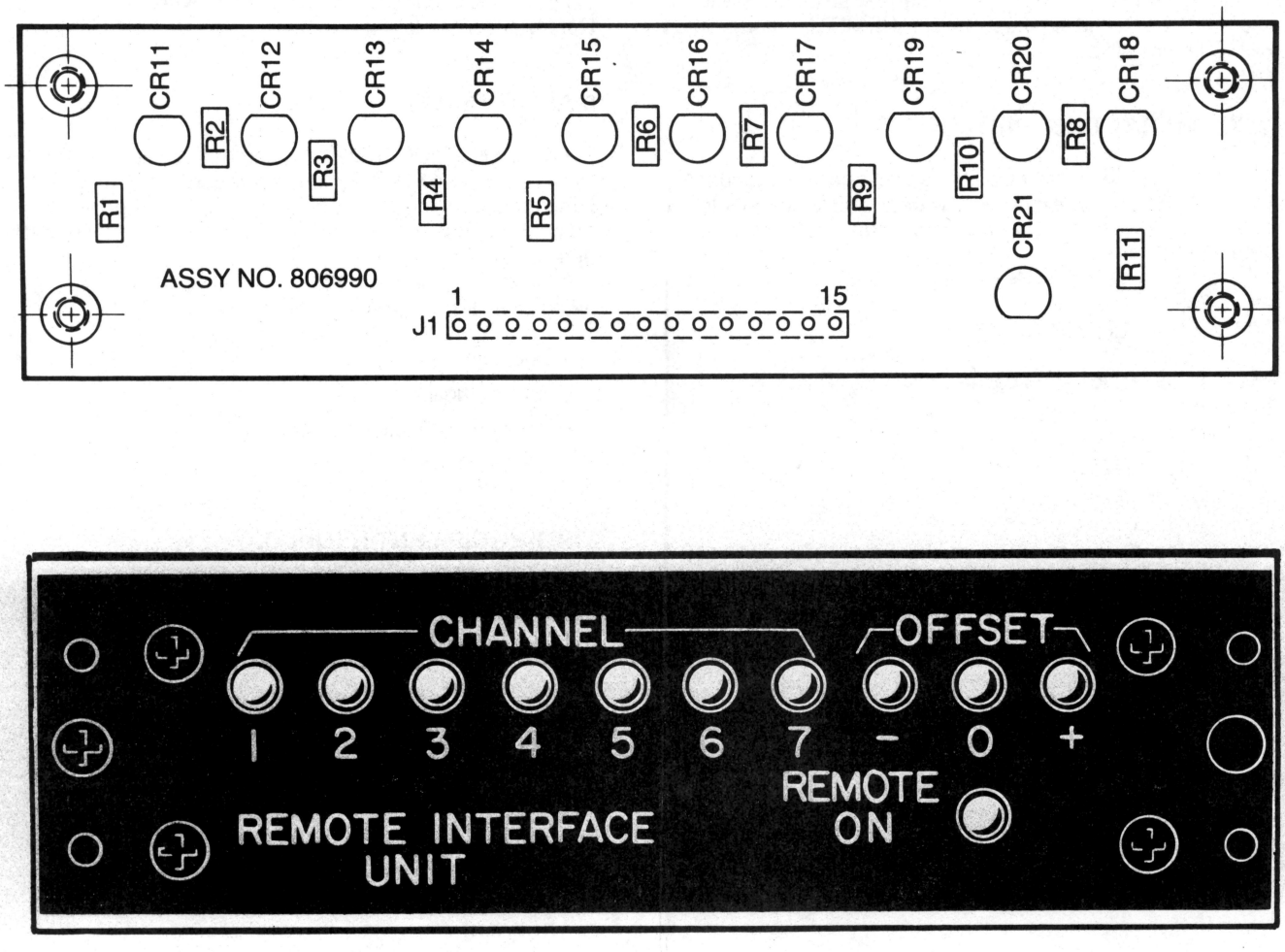


Figure 1. Remote Control Interface Unit – Front Panel/Component Locations

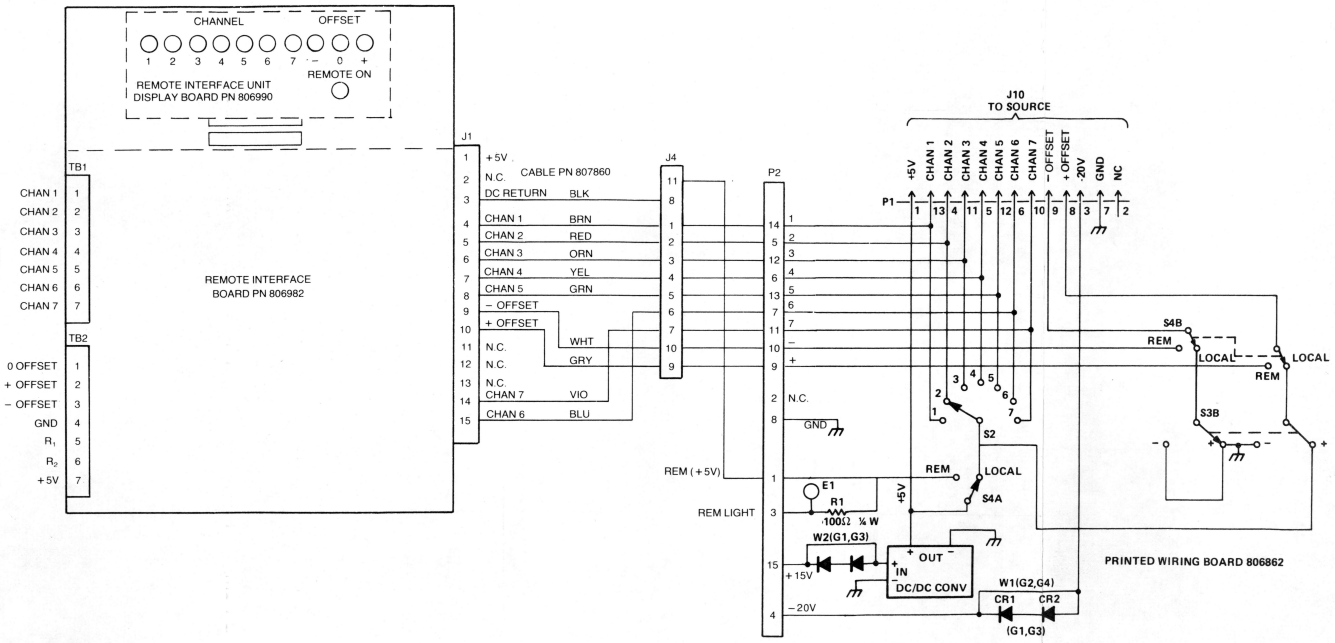
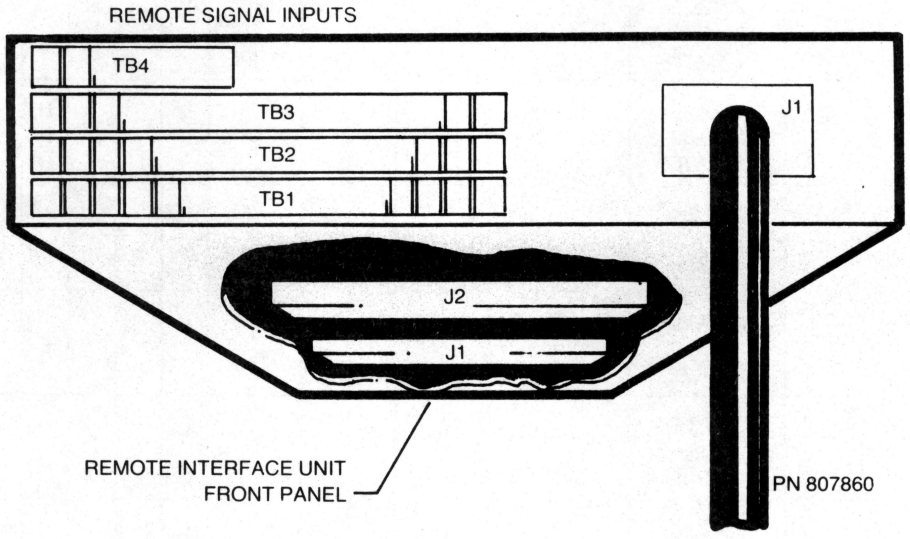


Figure 2. Remote Control Interface Unit – Interconnection Wiring Diagram



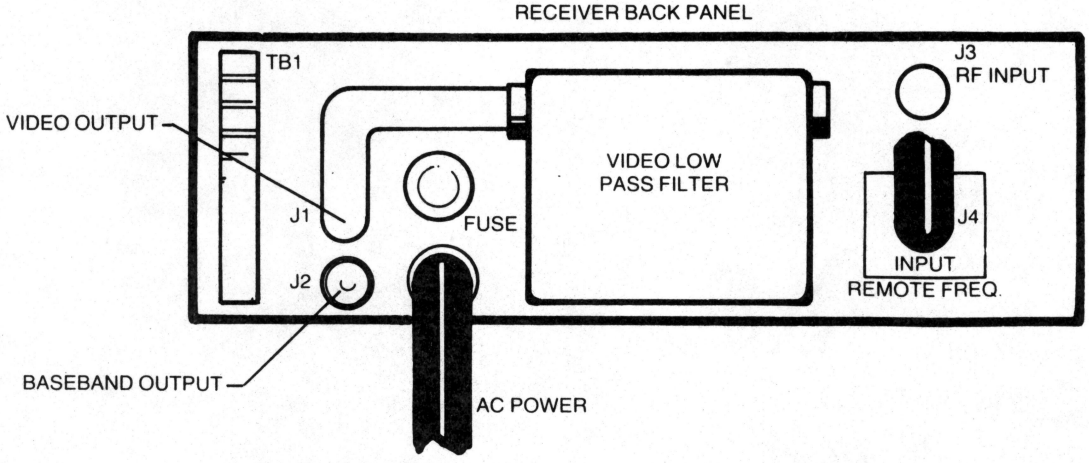


Figure 3. Remote Control Interface Unit – Rear Panel Connections

Table 1. Remote Interface Unit – Channel Select Truth Table PN 806987

BASIC CHANNEL	OFFSET (NOTE 5)	CHANNEL FREQUENCY (GHz)	REMOTE SIGNAL INPUT (NOTE 3)										COMMAND LOGIC TO RECEIVER								
			BASIC CHANNEL SELECT TB1 PIN NO.							OFFSET SELECT TB2 PIN NO.			BASIC CHANNEL SELECT J1 PIN NO.							OFFSET CONTROL J1 PIN NO.	
			1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	15	14	10	9
1	–	1994.75	L									L	H							L	L
	0	1999.00	L							L			H								
	+	2003.25	L								L		H							H	L
2	–	2012.25		L								L		H						L	L
	0	2016.50		L						L				H							
	+	2020.75		L							L			H						H	L
3	–	2029.25			L							L			H					L	L
	0	2033.50			L					L					H						
	+	2037.75			L						L				H					H	L
4	–	2046.25				L						L				H				L	L
	0	2050.50				L				L						H					
	+	2054.75				L					L					H				H	L
5	–	2063.25					L					L					H			L	L
	0	2067.50					L			L							H				
	+	2071.75					L				L						H			H	L
6	–	2080.25						L				L						H		L	L
	0	2084.50						L		L								H			
	+	2088.75						L			L							H		H	L
7	–	2097.25							L			L							H	L	L
	0	2101.50							L	L									H		
	+	2105.75							L		L								H	H	L

NOTES: 1. RX Local/Remote mode switch in REMOTE position.
2. +5V power supplied to Remote Interface Unit by Receiver.
3. Required conditions must be maintained for duration of selection.
4. Logic: L = GND (connected to TB2-4); H = +5V; all other pins are open.
5. Channel offset code: – = minus offset; 0 = center (no offset); + = plus offset.

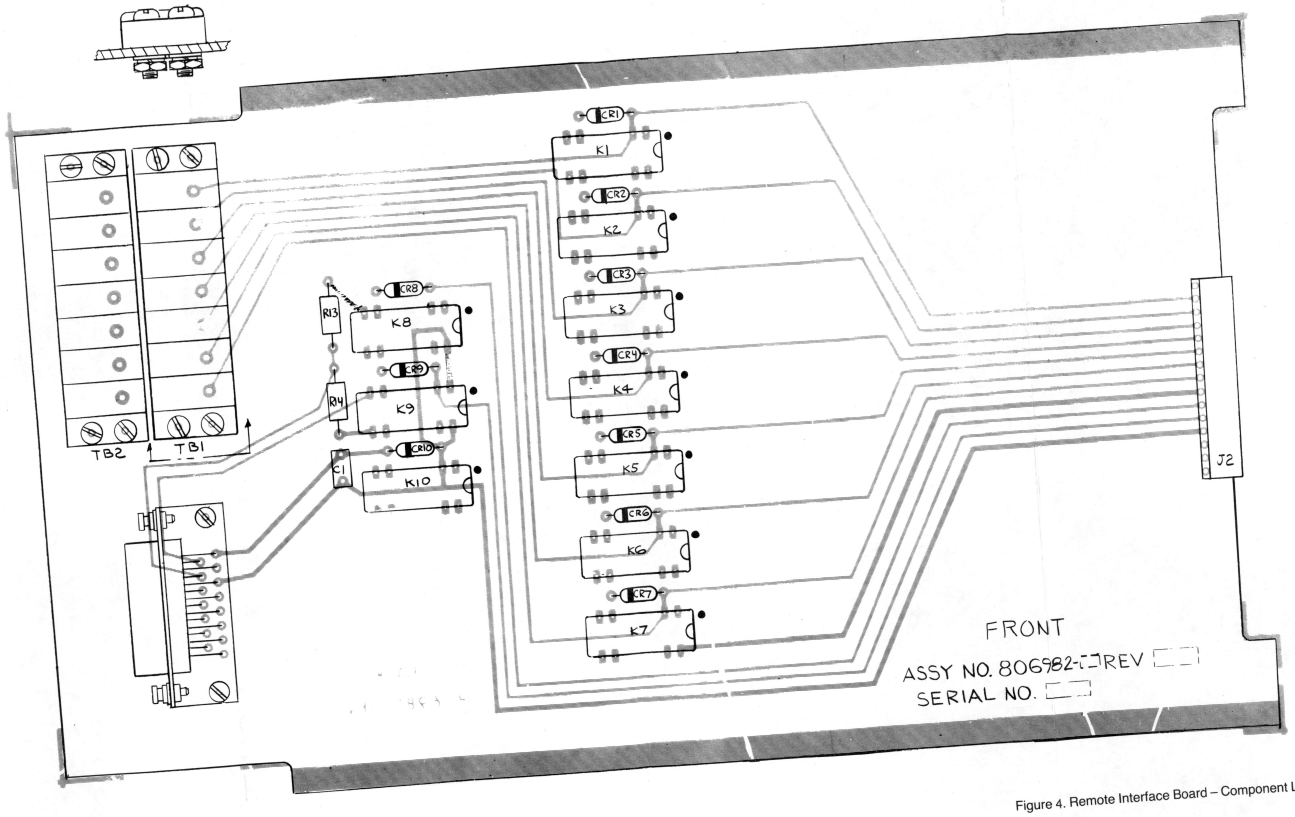


Figure 4. Remote Interface Board – Component Locations PN 806982

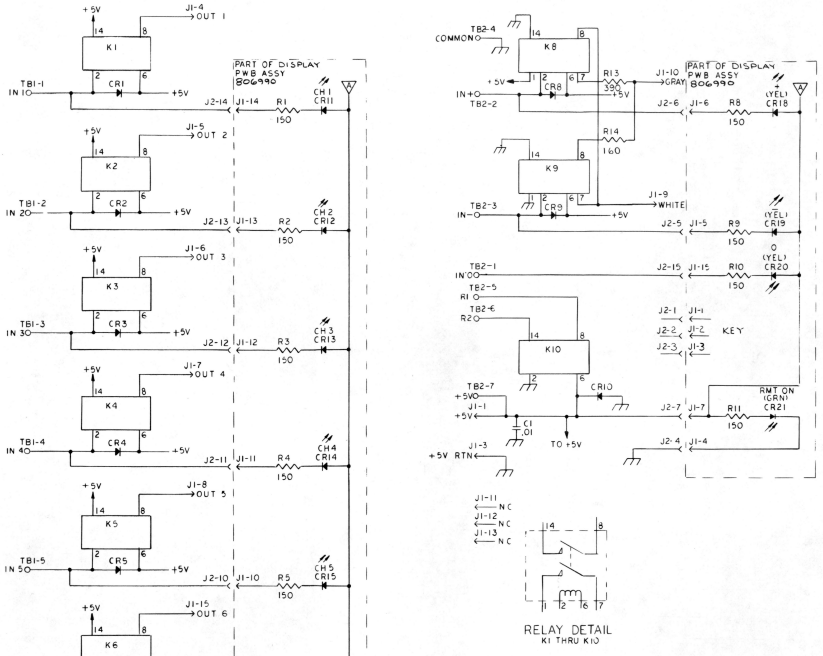


Figure 5. Remote Interface Board – Schematic Diagram PN 806982

REMOTE INTERFACE UNIT ASSEMBLY PN 806987

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
	Display Circuit Board Assembly	806990-1	MVS
	Remote Interface Board Assembly	806982-1	MVS
	Rear Panel	806989-1	MVS
	Cover	801852-1	MVS
	Side Plate	801853-1	MVS
	Front Panel	801851-1	MVS
	Blank Panel	801869-1	MVS
	Remote Control Cable	807860-1	MVS

Remote Control Unit PN 806987

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
DISPLAY CIRCUIT BOARD ASSEMBLY PN 806990-1			
	Front Panel	806988-1	MVS
	Connector, 15 Position, Male	89351-75	Molex 22-04-2151
	Standoff	88380-63	CTC 7409-11
	DIODES		
CR11,CR12,CR13,CR14, CR15,CR16,CR17	LED, Red	89918-60	
CR18,CR19,CR20	LED, Yellow	89904-12	
CR21	LED, Green	89918-77	
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R1,R2,R3,R4,R5,R6,R7, R8,R9,R10,R11	150	89204	RC07GF151J03

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
REMOTE INTERFACE PWB ASSEMBLY PN 806982			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1	0.01, 200V	87211	Vitramon CK06BX103K
	DIODES		
CR1,CR2,CR3,CR4,CR5, CR6,CR7,CR8,CR9,CR10	1N914A	89405	GE
	CONNECTORS		
J1	Right Angle, 15 Pin	89759-13	Cannon DA15PA
J2	Female, 15 Position	89350-93	Molex 22-15-2151
	RELAYS		
K1,K2,K3,K4,K5, K6,K7,K8,K9,K10	Relay	89800-22	Sigma 191TE2A1-5G
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R13	390	89180	RC07GF391J03
	TERMINAL BLOCKS		
TB1,TB2	PC Mount, 7 Position	89892-1	

REMOTE INTERFACE UNIT

FUNCTION

The Remote Control Interface Unit (Figure 1) is designed for remote control operation on some of M/A-COM's 21 Channel Receivers. These receivers normally are provided with seven basic RF channels and fourteen offset channels. The Remote Control Interface Unit can be adapted to control 10 Channel Receivers also.

The operator is able to make channel selections using a frequency shift key (FSK) system connected to the Remote Interface Unit at terminal boards TB1 through TB4. The output of the interface is connected via cable to the receiver. The signal is then forwarded to the channel selection switch board. The Receiver must be in REMOTE mode for REMOTE operation.

MECHANICAL DESCRIPTION

The Remote Control Interface Unit is packaged in a standard M/A-COM remote type module. It is designed to be mounted in a standard 19-inch EIA equipment rack adjacent to the Receiver it controls.

FRONT PANEL INDICATORS

The front panel indicators consist of

- 1 to 7 channel indicator lamps
- +,0,– offset indicator lamps
- power monitor lamp

The power lamp illuminates when the unit is powered and in operation. The channel and offset lamps indicate which channel and offset has been selected.

REAR PANEL CONNECTIONS

The rear panel consists of four terminal boards and one output connector. An interconnection wiring diagram is given in Figure 2.

Terminal Board 1 consists of eight input terminals (one for each "+" channel and a key).

Terminal Board 2 consists of eight input terminals (one for each "0" offset channel and a key).

Terminal Board 3 consists of eight input terminals (one for each "–" offset channel and a key).

Terminal Board 4 consists of four input terminals (two for returns, one for +5V out, and a common).

Output connector J1 is connected via cable to the Receiver it controls (Figure 3).

MAINTENANCE

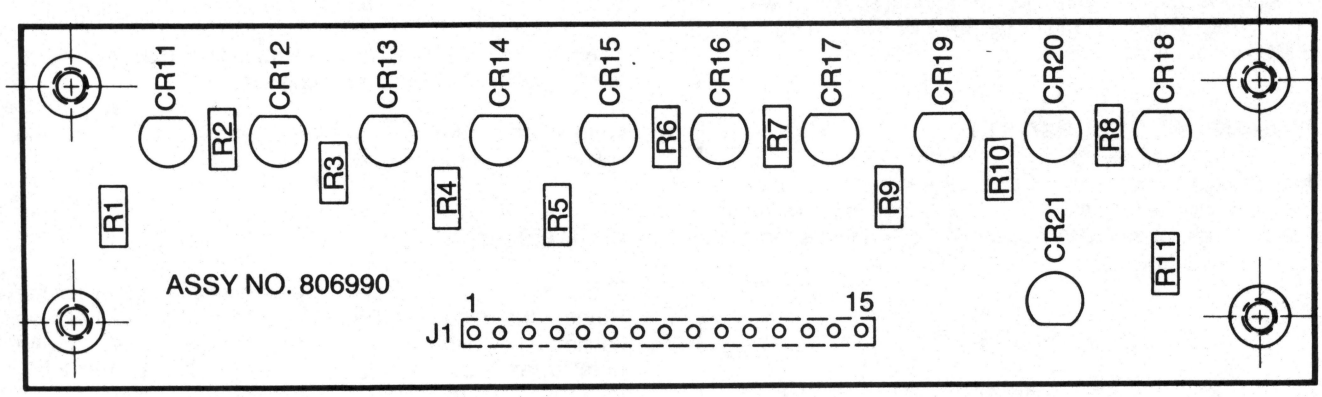
There is no specific routine maintenance required for the Remote Interface Unit. Proper operation of the unit can be confirmed by simulating operating conditions given in the truth tables (Tables 1 and 2) to verify that the Remote Interface Unit is operational.

If equipment is not working, check

- input signals
- output signals
- Receiver is functioning correctly
- PWB for breaks

TEST EQUIPMENT REQUIRED

DC VTM or (DVM) – Hewlett Packard HP412 or RCA Volt Ohmist



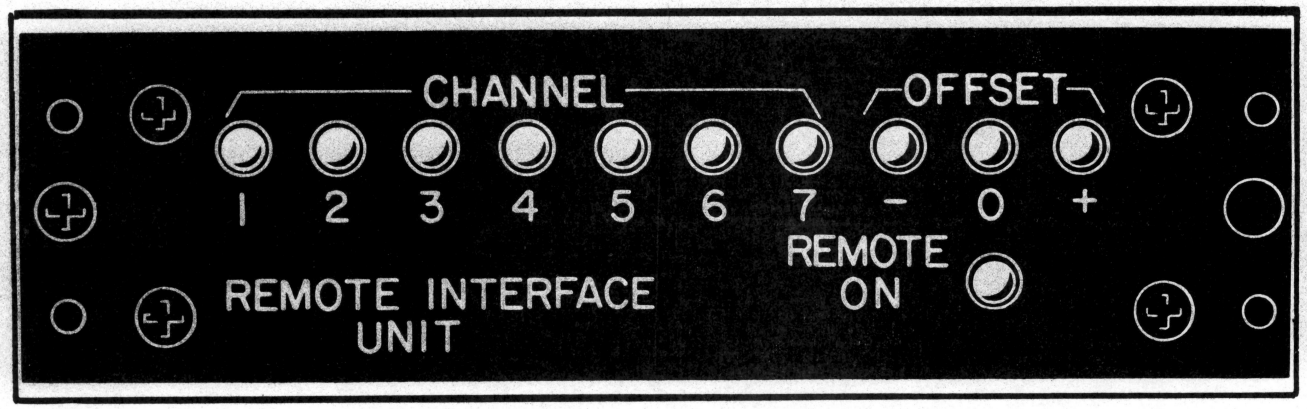


Figure 1. Remote Control Interface Unit – Front Panel/Component Locations

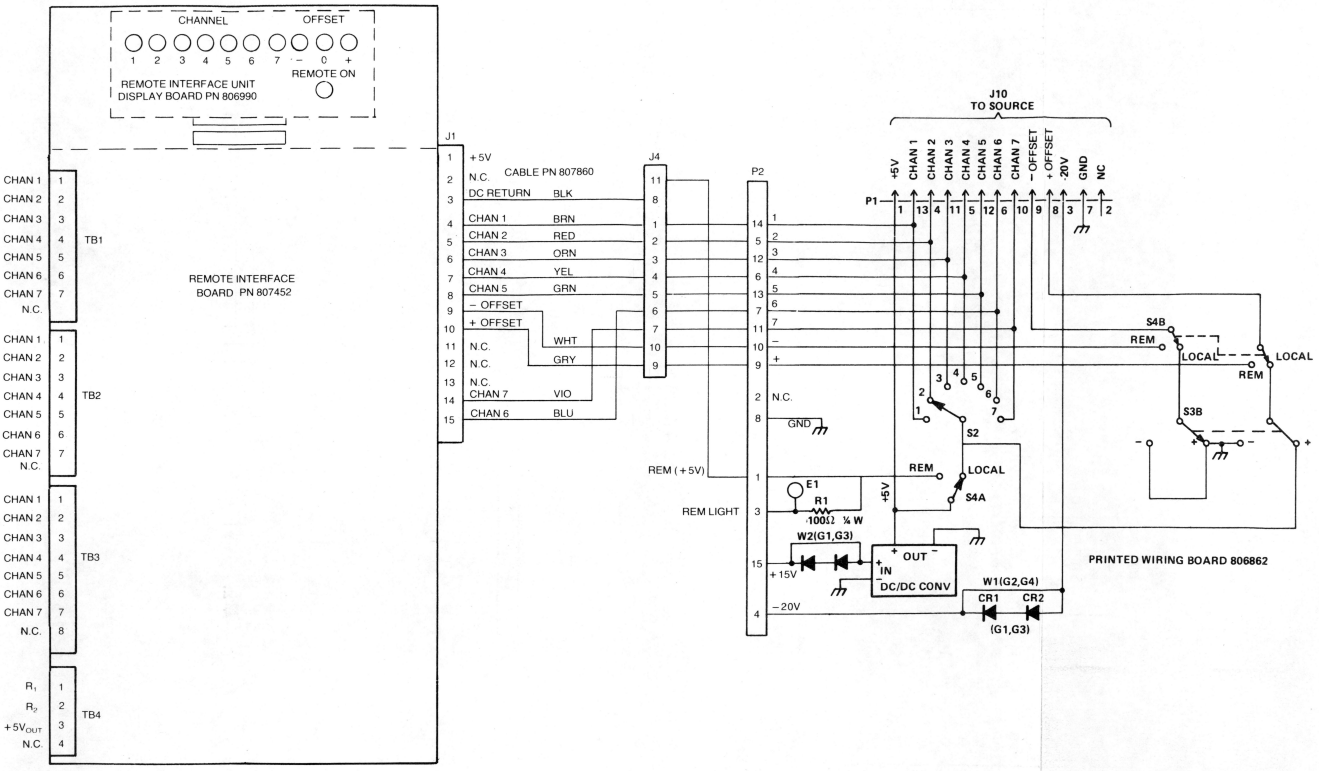
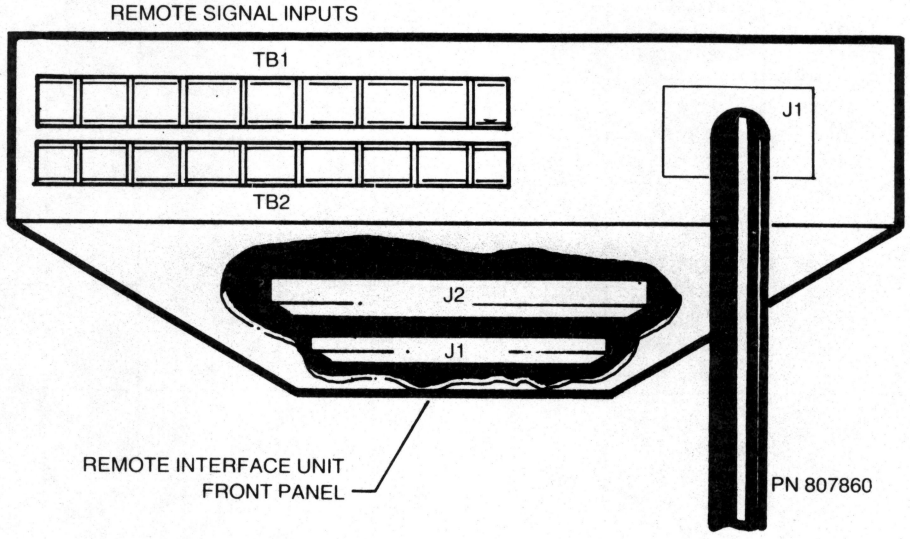


Figure 2. Remote Control Interface Unit – Interconnection Wiring Diagram



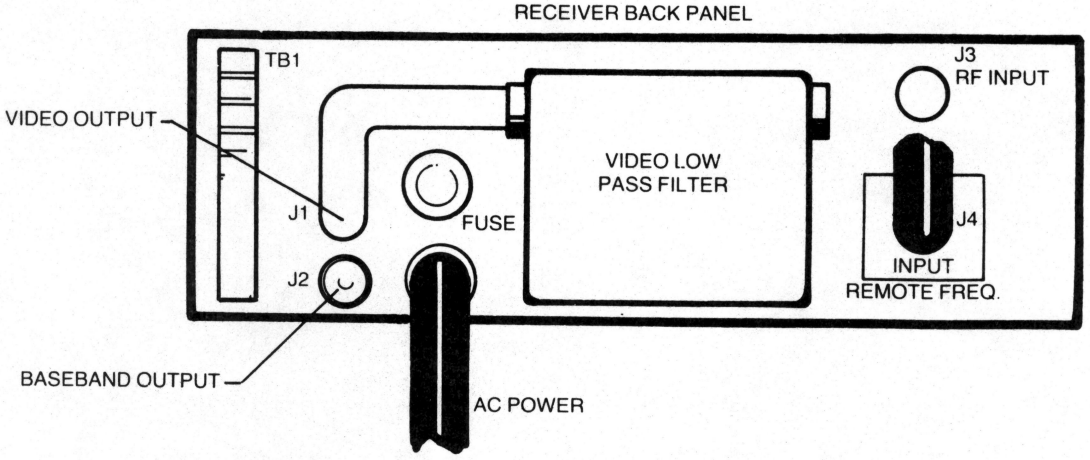


Figure 3. Remote Control Interface Unit – Rear Panel Connections

Table 1. Remote Interface Unit – Channel Select Truth Table PN 806987

BASIC CHANNEL	OFFSET (NOTE 5)	CHANNEL FREQUENCY (GHz)	REMOTE SIGNAL INPUT (NOTE 3)										COMMAND LOGIC TO RECEIVER								
			BASIC CHANNEL SELECT TB1 PIN NO.							OFFSET SELECT TB2 PIN NO.			BASIC CHANNEL SELECT J1 PIN NO.							OFFSET CONTROL J1 PIN NO.	
			1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	15	14	10	9
1	–	1994.75	L									L	H							L	L
	0	1999.00	L							L			H								
	+	2003.25	L								L		H							H	L
2	–	2012.25		L								L		H						L	L
	0	2016.50		L						L				H							
	+	2020.75		L							L			H						H	L
3	–	2029.25			L							L			H					L	L
	0	2033.50			L					L					H						
	+	2037.75			L						L				H					H	L
4	–	2046.25				L						L				H				L	L
	0	2050.50				L				L						H					
	+	2054.75				L					L					H				H	L
5	–	2063.25					L					L					H			L	L
	0	2067.50					L			L							H				
	+	2071.75					L				L						H			H	L
6	–	2080.25						L				L						H		L	L
	0	2084.50						L		L								H			
	+	2088.75						L			L							H		H	L
7	–	2097.25							L			L							H	L	L
	0	2101.50							L	L									H		
	+	2105.75							L		L								H	H	L

NOTES: 1. RX Local/Remote mode switch in REMOTE position.
2. +5V power supplied to Remote Interface Unit by Receiver.
3. Required conditions must be maintained for duration of selection.
4. Logic: L = GND (connected to TB2-4); H = +5V; all other pins are open.
5. Channel offset code: – = minus offset; 0 = center (no offset); + = plus offset.

Table 2. Remote Interface Unit – Channel Select Truth Table PN 807450

BASIC CHANNEL	CHANNEL OFFSET (NOTE 5)	FREQUENCY (MHz)	REMOTE SIGNAL INPUT (NOTE 3) (BASIC CHANNEL AND OFFSET SELECT)	COMMAND LOGIC TO RECEIVER								
				BASIC CHANNEL SELECT J1 PIN NO.							OFFSET CONTROL J1 PIN NO.	
				4	5	6	7	8	15	14	10	9
1	–	1994.75	TB3-1 = L	H							L	L
	0	1999.00	TB2-1 = L	H								
	+	2003.25	TB1-1 = L	H							H	L
2	–	2012.25	TB3-2 = L		H						L	L
	0	2016.50	TB2-2 = L		H							
	+	2020.75	TB1-2 = L		H						H	L
3	–	2029.25	TB3-3 = L			H					L	L
	0	2033.50	TB2-3 = L			H						
	+	2037.75	TB1-3 = L			H					H	L
4	–	2046.25	TB3-4 = L				H				L	L
	0	2050.50	TB2-4 = L				H					
	+	2054.75	TB1-4 = L				H				H	L
5	–	2063.25	TB3-5 = L					H			L	L
	0	2067.50	TB2-4 = L					H				
	+	2071.75	TB1-5 = L					H			H	L
6	–	2080.25	TB3-6 = L						H		L	L
	0	2084.50	TB2-6 = L						H			
	+	2088.75	TB1-6 = L						H		H	L
7	–	2097.25	TB3-7 = L							H	L	L
	0	2101.50	TB2-7 = L							H		
	+	2105.75	TB1-7 = L							H	H	L

NOTES: 1. RX Local/Remote mode switch in REMOTE position.
2. +5V power supplied to Remote Interface Unit by Receiver.
3. Momentary (10 msec minimum) or continuous contact closures may be used. Unlatching takes place automatically when a new selection is made.
4. Logic: L = GND (connected to TB4-4); H = +5V; all other pins are open.
5. Channel offset code: – = minus offset; 0 = center (no offset); + = plus offset.

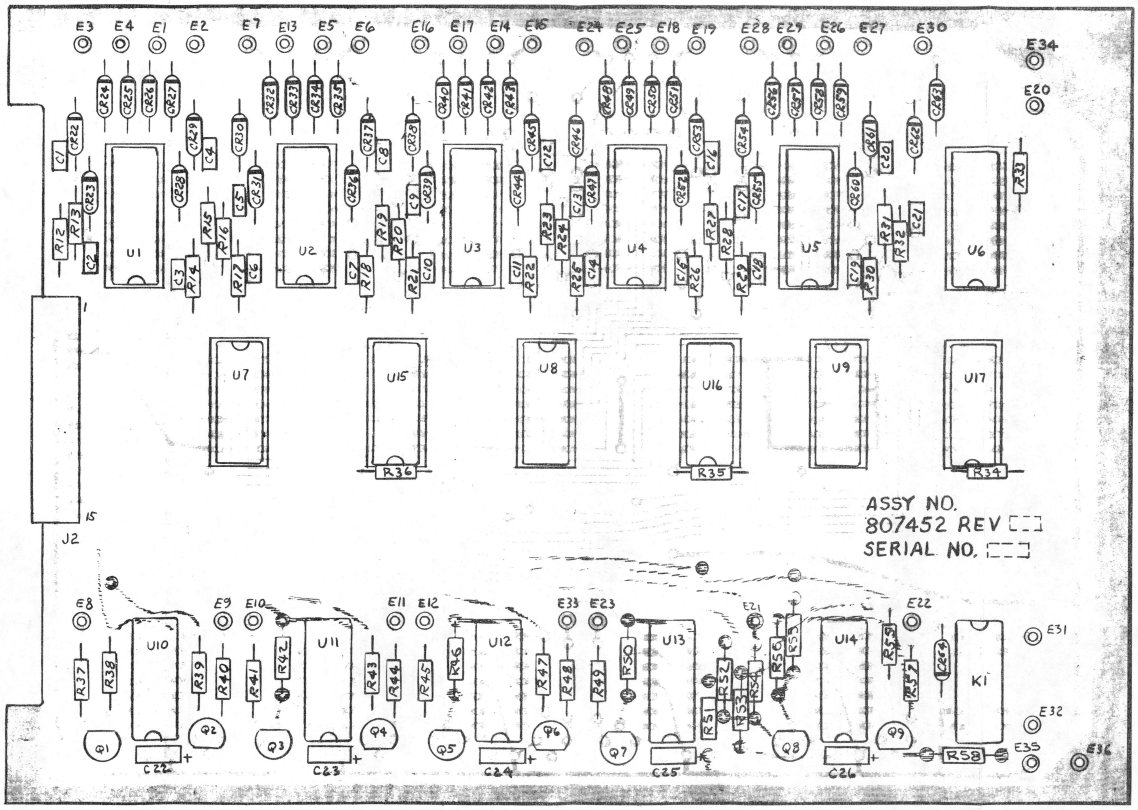


Figure 4. Remote Interface Board – Component Locations PN 807452

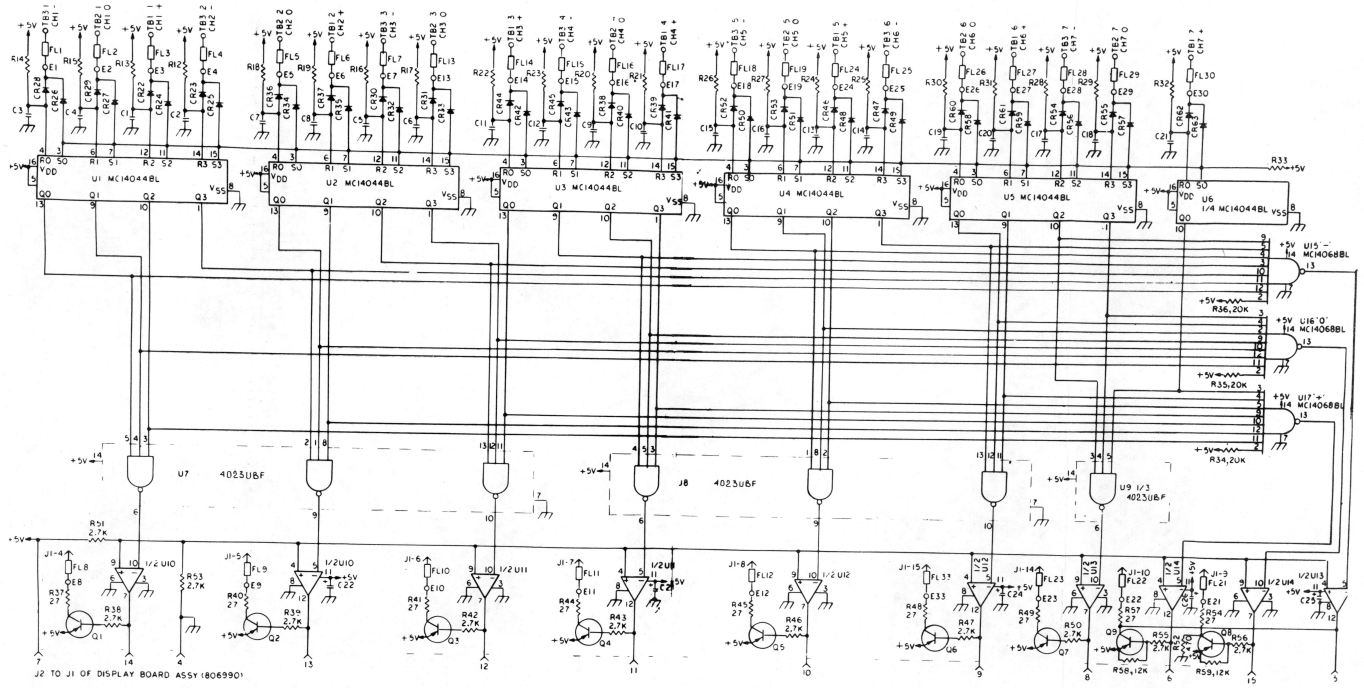


Figure 5. Remote Interface Board – Schematic Diagram PN 807452

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
REMOTE INTERFACE UNIT ASSEMBLY PN 807450			
	Display Circuit Board Assembly	806990-1	MVS
	Remote Interface Board Assembly	807452-1	MVS
	Rear Panel	807456-1	MVS
	Cover	801852-1	MVS
	Side Plate	801853-1	MVS
	Front Panel	801851-1	MVS
	Blank Panel	801869-1	MVS
	Sliding Lock Post	89361	Cannon D53018
	Terminals 4-40	88510-18	
	Standoff	88501-3	
	Connector Bracket	89759-22	Cannon DA015-0339-000
	Ground Lug No. 503	88520-04	Zierick
	Remote Control Cable	807860-1	MVS
	Feedthru Filter	88212-15	
J1	Connector, 15 Pin	89759-21	Cannon DA15P
TB1,TB2,TB3	Terminal Block	89197-90	Beau 71208
TB4	Terminal Block	89197-83	Beau 71204

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
DISPLAY CIRCUIT BOARD ASSEMBLY PN 806990-1			
	Front Panel	806988-1	MVS
	Connector, 15 Position, Male	89351-75	Molex 22-04-2151
	Standoff	88380-63	CTC 7409-11
	DIODES		
CR11,CR12,CR13,CR14, CR15,CR16,CR17	LED, Red	89918-60	
CR18,CR19,CR20	LED, Yellow	89904-12	
CR21	LED, Green	89918-77	
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R1,R2,R3,R4,R5,R6,R7, R8,R9,R10,R11	150	89204	RC07GF151J03

REF DES	DESCRIPTION	PART NO.	SIMILAR TO
REMOTE INTERFACE PWB ASSEMBLY PN 807452			
	CAPACITORS		
All capacitors are in microfarads unless otherwise specified.			
C1,C2,C3,C4,C5,C6,C7,C8, C9,C10,C11,C12,C13,C14, C15,C16,C17,C18,C19, C20,C21	0.001, 200V	87210	Vitramon CK05BX102K
C22,C23,C24,C25,C26	1.5, 50V	89016	Kemet K1RW50
	DIODES		
CR22,CR23,CR24,CR25,CR26, CR27,CR28,CR29,CR30,CR31, CR32,CR33,CR34,CR35,CR36, CR37,CR38,CR39,CR40,CR41, CR42,CR43,CR44,CR45,CR46, CR47,CR48,CR49,CR50,CR51, CR52,CR53,CR54,CR55,CR56, CR57,CR58,CR59,CR60,CR61, CR62,CR63,CR64	1N914A	89405	GE
	TERMINALS		
E1,E2,E3,E4,E5,E6,E7,E8,E9, E10,E11,E12,E13,E14,E15,E16 E17,E18,E19,E20,E21,E22,E23, E24,E25,E26,E27,E28,E29,E30, E31,E32,E33,E34,E35,E36	Terminal	89383	CTC 3653-2
	CONNECTORS		
J2	Female, 15 Pin	89350-93	Molex 22-15-2151
	RELAYS		
K1	Relay	89800-22	Sigma 191TE2A1-5G
	TRANSISTORS		
Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9	2N3906	89727	Motorola
	RESISTORS		
All resistors are in 1/4W 5% ohms unless otherwise specified.			
R12,R13,R14,R15,R16,R17,R18, R19,R20,R21,R22,R23,R24,R25, R26,R27,R28,R29,R30,R31,R32, R33,R34,R35,R36	20K	89200-14	RC07GF203J
R37	27	89200	RC07GF270J